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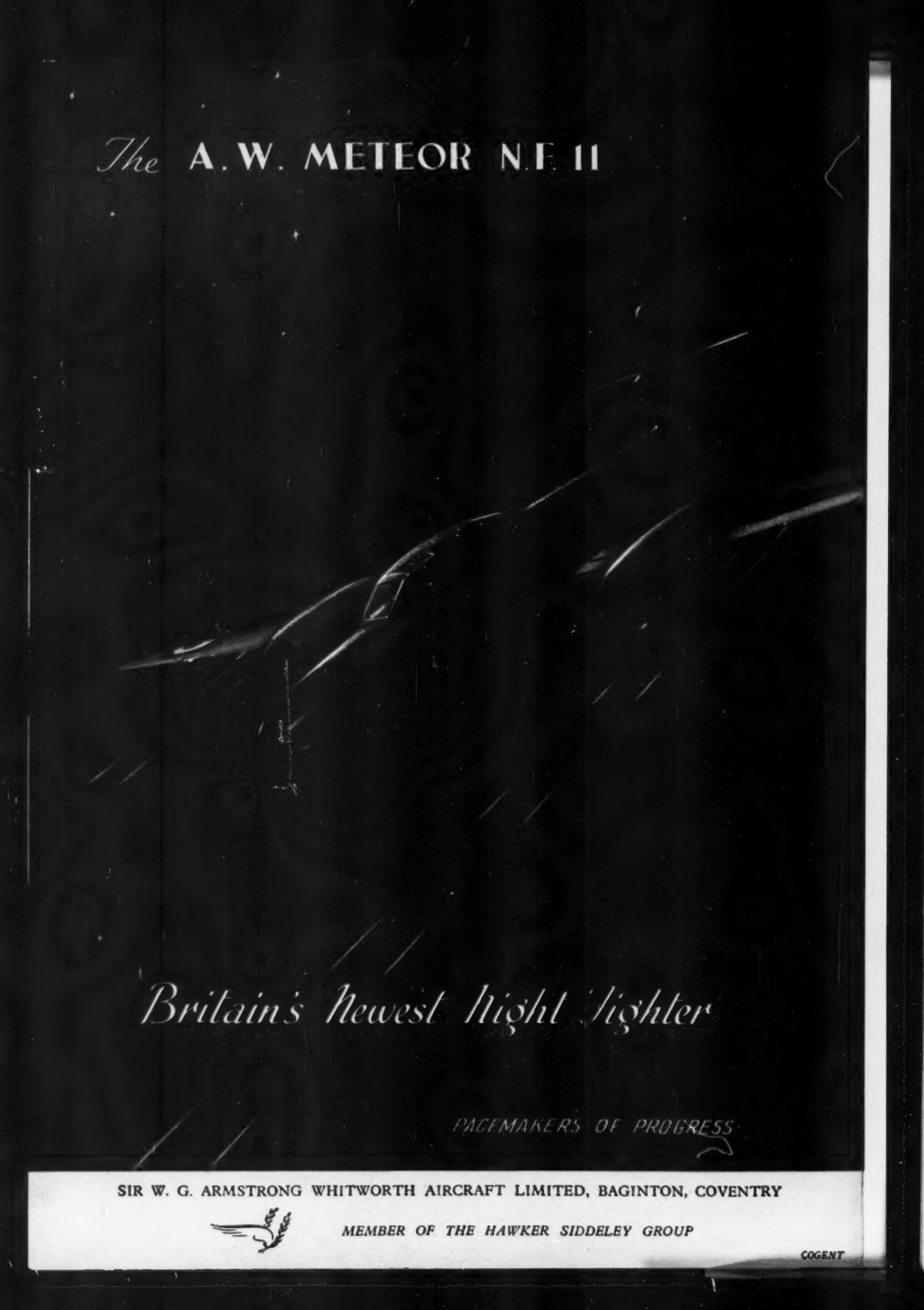

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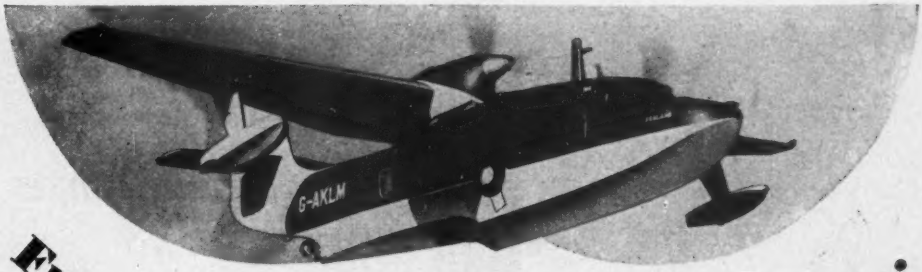
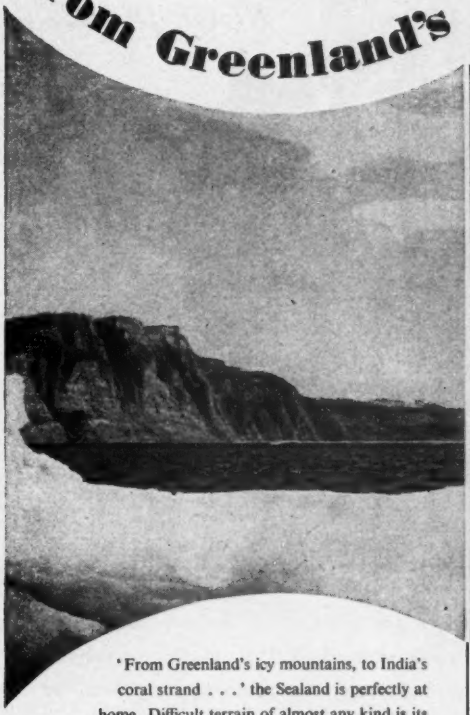
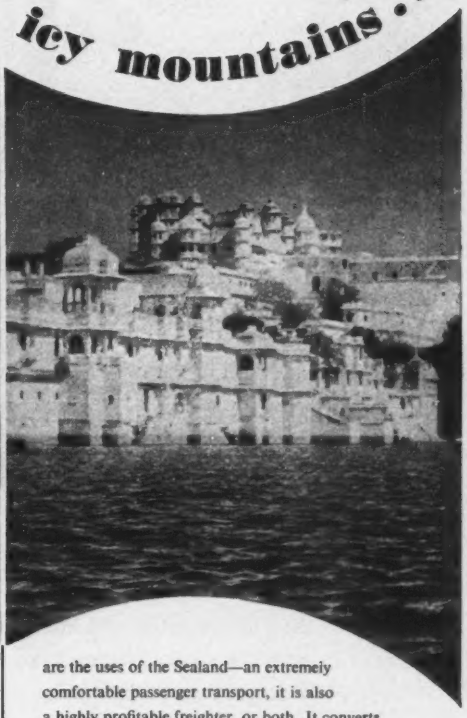


From Greenland's icy mountains . . .





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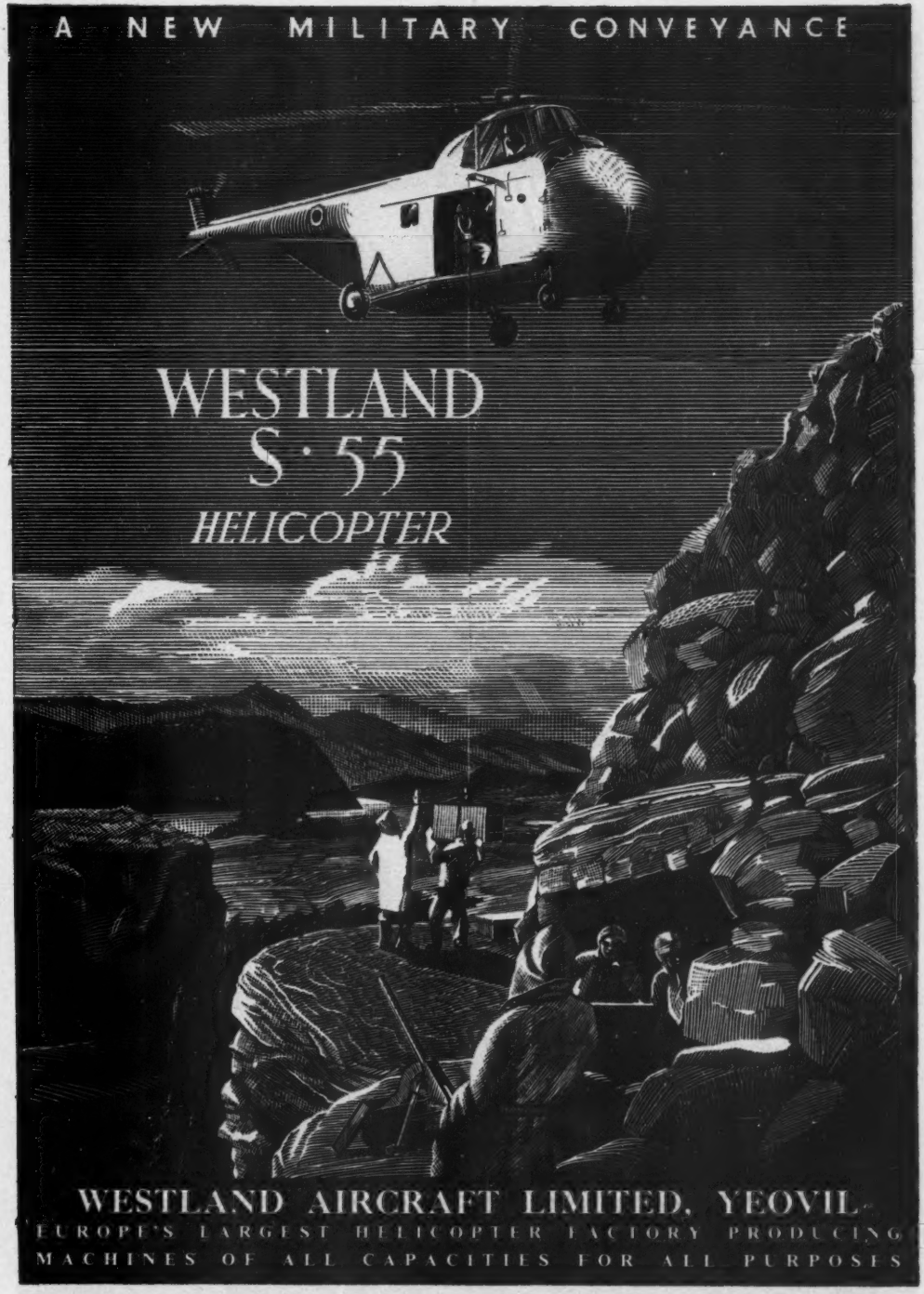
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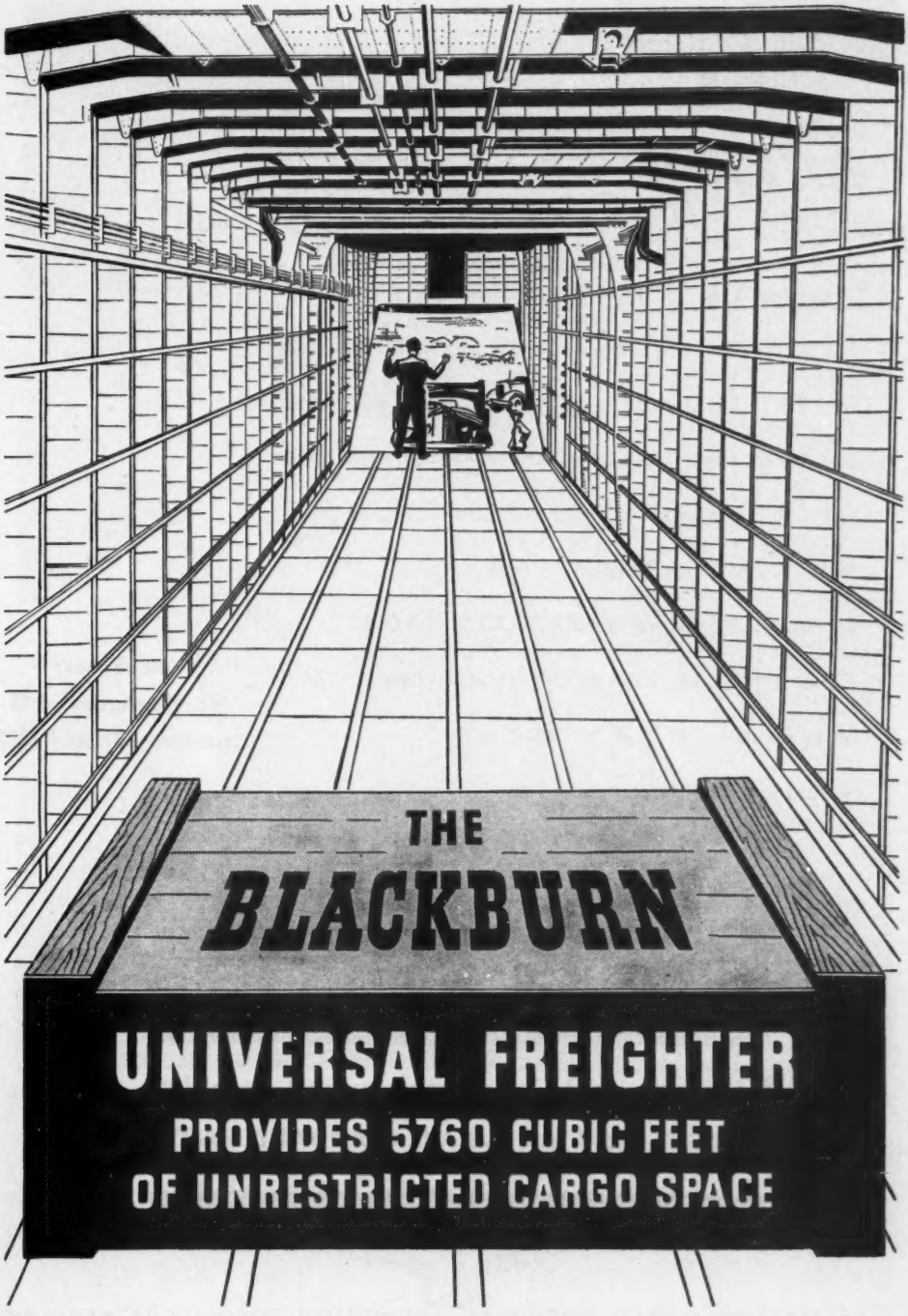
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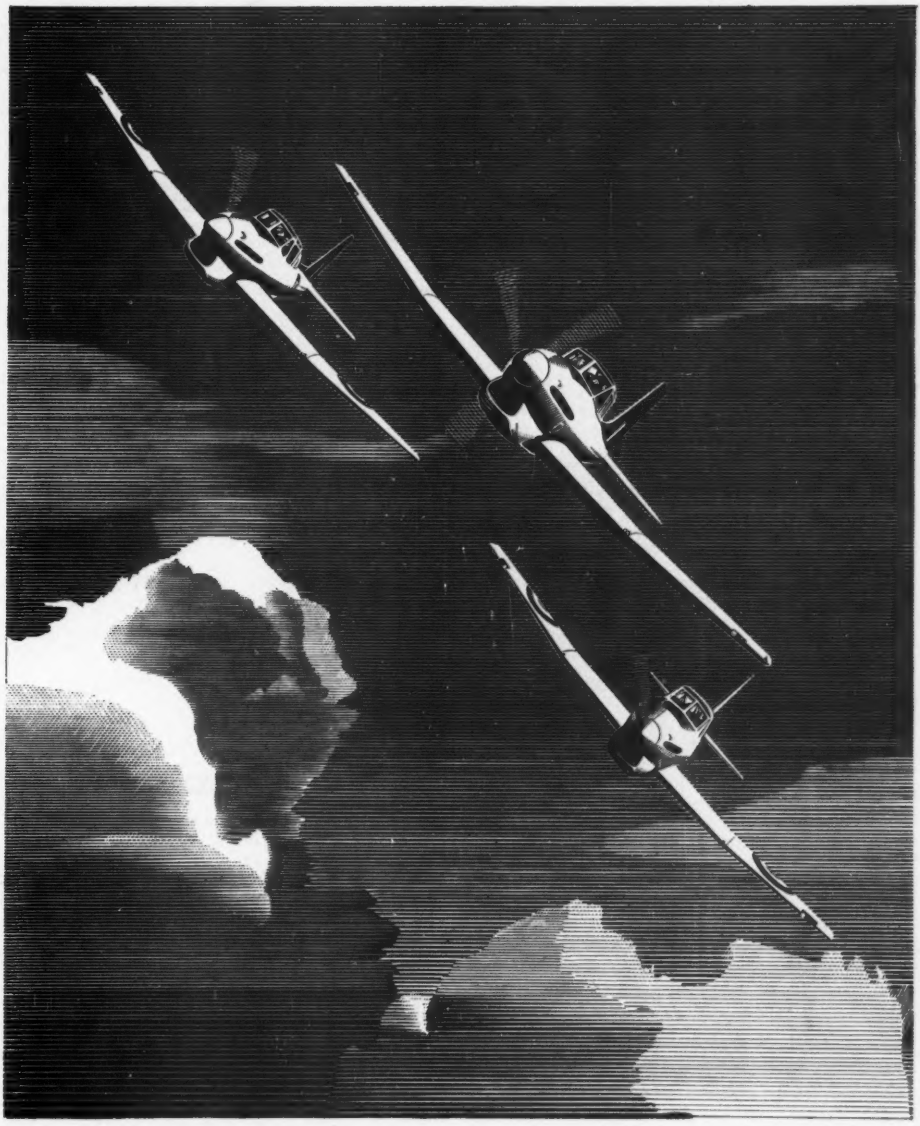

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Paris—Potential, but little Production

TO the several reasons for loss of sleep during the frantic period of preparation for the opening of the Paris Show one more was added this year—thunderstorms of unusual severity. Yet English visitors, who at home would almost certainly have approached one another with observations about the amount of rain which had fallen, made few references to the weather. They were far more concerned over the unsubstantial nature of France's aircraft contribution, and their doubts were reflected in the common greeting—a not-very-hopeful "What do you think of the Show?" The unreassuring answers they received were much the same on all sides and from each nationality: "So far as *aircraft* are concerned there is precious little to be seen."

Aircraft have, in fact, almost outgrown the Salon, but it still serves the manufacturers of power units and accessories and provides a meeting place far more convenient and agreeable than an airfield. In addition, many of the public look forward to the opportunity of seeing light aircraft, engines, and components at close quarters in the Grand Palais. They are the taxpayers, and the value of their favourable opinion and support for aviation should not be underestimated. Technical interest will this year be concentrated more upon the associated display at Le Bourget next week. A number of promising French aircraft, prototypes in the main, will be on view in the static park, and on the final day, July 1st, they will be joined in the air display by important British civil and military aircraft which are to be flown over from this country, though probably not landed. A spectacular non-stop double Atlantic flight is also planned to enable visitors to see two of the huge American B-36s, of similar dimensions to the Brabazon (which is also expected to fly over Le Bourget), but considerably heavier.

France Needs a Lead

The French, and the Italians, too, have once again provided examples of their skill and ingenuity, and few people will come away from the exhibition without having learned at least a little. That there is a feeling of disappointment and concern, however, cannot be denied, for no one is able to forget the dangers of the times nor the urgency of the Allied defence requirements. How can such undoubted ability and so much productive capacity as is to be found in Western Europe—and more particularly in France and Italy—be put to better use? Why, in more than two years since the last Paris Show, has France's contribution to Allied air strength been so small? This is the sort of question that is being asked. Only a part of the blame should be laid at the door of the industry itself, and none at that of the fighting Services, who, we believe, make remarkably good use of inadequate equipment. The lack of direction and co-ordination at the highest levels is more likely to be responsible for the procrastination and dabbling that has taken the place of a clear-cut policy and production lines. Great Britain and America will have to give the aircraft industries of the Continental countries encouragement and a stronger lead.

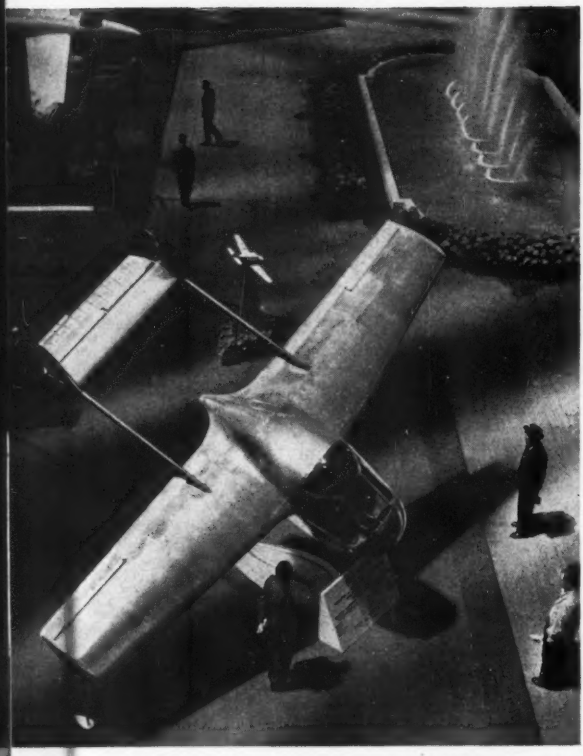
Not long ago there was a ministerial resignation in this country occasioned by difference of opinion over the British rearmament programme, and many will agree that our aircraft industry, as constituted at present, or when expanded to the foreseeable maximum for the period concerned, can have little hope of attaining all its targets *unaided*. But that is the keyword, and in our opinion the crux of the matter. Let us not consider the Bevan course of cutting-back the defence programme which, large as it is, probably still falls short of requirements. Rather let us appeal without more delay to our Allies who have the manpower and factories to take over a proper share of the work at the point where Britain, with her many commitments, runs short of production capacity. Not in the aircraft industry alone, but in many others, too, there is enough work for all here to be engaged to capacity, with plenty still to subcontract to others.

We believe that a much greater degree of industrial alliance is urgently needed in addition to pacts for mutual aid. It may be that this alone will enable such treaties to be honoured in fact as well as in spirit.

The Nineteenth Paris Salon

A Preliminary Survey of Exhibits in the Grand Palais

Illustrated by "Flight" Photographs



The S.I.P.A. 200, above, is suitable for jet training, high-speed communication flying or private ownership. The estimated sea level top speed, with Turbomeca Palas, is 266 m.p.h.

Balcony scene: The arrival of President Auriol on June 15th. To the right of the picture are the Fouga Lutin and S.I.P.A. 200; opposite are the Hurel-Dubois H.D.10 and the Morane-Saulnier M.S.731 trainer.

FOR the nineteenth time the Grand Palais of Paris, harmoniously set in the delectable Champs Elysées, is the scene of what might be described as the "metropolitan" section of the International Aeronautical Salon; but while this beautiful building itself houses a sizeable collection of small and medium aircraft, power plants, equipment, materials and miscellaneous exhibits, these items represent only a modest proportion of this year's aggregate. As from to-day (June 22nd) the larger types of aircraft are to be displayed at Le Bourget where, as a grand finale, on Sunday, July 1st, a most impressive international flying display will be presented. On that date the Salon and associated proceedings will officially conclude.

President Auriol's opening of the Salon at the Grand Palais on the morning of June 15th prompted the reflection that, notwithstanding a certain instability in some spheres of their national life, our French friends have persevered in a most admirable manner with their long series of aeronautical salons. Comparison of photographs showing the exhibits of 1909 and those of the present is an education in itself: though the surroundings are but little changed, the aircraft and engines themselves tell in a dramatic manner practically the whole story of aircraft development. It is to be hoped that the industrious M. André Granet, the organizing secretary-general, and M. Georges Héreil, president of the *Union Syndicale des Industries Aéronautiques*, will long be enabled to continue this historic series of aeronautical "manifestations." It must be expected, however, that the Grand Palais itself will be progressively subordinated to the exhibition and displays at Le Bourget or some other airfield.

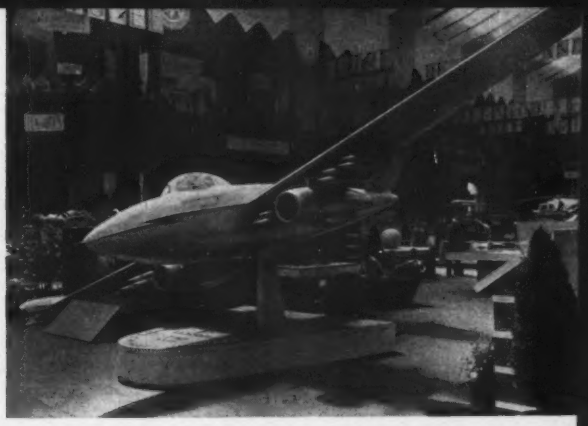
Predominating among the full-scale aircraft in the Salon this year are the trainers and tourers. Two of these—the Fouga Lutin and S.I.P.A. 200—are novel jet-propelled types. Though in themselves, perhaps, of relatively small account, they exemplify current tendencies in their field. Surprisingly, there is only one complete first-line military machine (the Dassault Ouragan) and only two new helicopters.

Some idea of the scope of the Grand Salon presentation will be conveyed by the following brief accounts of the various classes of exhibits. A further review, including information on new aircraft, power plants and accessories not actually displayed though represented by models or otherwise, will appear in our next issue.

Military

The Nene-powered Dassault Ouragan is equipped for reconnaissance, having provision for vertical and oblique

President Auriol (right) discusses features of the Rolls-Royce Avon. The Avon was making its first public appearance.



The Fouga Lutin sporting or jet-training aircraft, with two Turbomeca Palas turbojets. The estimated top speed is 310 m.p.h.

cameras and—actually installed—wing-tip and under-wing auxiliary tanks. It bears the serial number 8 and, unlike the four-gun Ouragan intercepter, is armed with only two 20 mm Hispanos.

Across the aisle from the Ouragan is a mocked-up fuselage of a Nord 2501 Hercules-powered military or civil transport, laid out on Fairchild Packet lines and ordered in quantity for l'Armée de l'Air. This formula is one which has proved in Korea to possess many advantages over the conventional layout with which our own Air Force must, for the present, content itself.

Bulking surprisingly large is the first example of the Fokker S.14 Derwent IX-powered jet trainer, intended for transition, blind-flying, navigational, and tactical training of jet pilots. The dimensions of the S.14's fuselage result from the side-by-side seating, the generous provision for military equipment and the lateral ducts, while the wing area and span were dictated by the requirement for a low wing-loading —actually about 33 lb/sq ft.

Placarded as an *avion de competition*, the Fouga Lutin (C.M.82R) is a three-quarter-scale flying model for the C.M.821R trainer. With two underslung Turbomeca Palas turbojets the Lutin is estimated to be capable of 310 m.p.h. It is shown carrying twelve rockets and a single gun in the extreme nose. Generally it follows the Fouga constructional formula as expressed in the Sylphe and Cyclope.

The S.I.P.A. 200 is claimed to be suitable for jet-transition training or high-speed liaison. The example shown is incomplete. It is a mid-wing, metal-constructed monoplane with two side-by side seats in a central nacelle, which also houses the Palas turbojet, fed, Vampire fashion, from wing-root intakes. The undercarriage is a retractable tricycle, and the tail is carried on twin booms. S.I.P.A. also display a standard S.12 tandem-two-seater trainer, with Renault 12S engine.

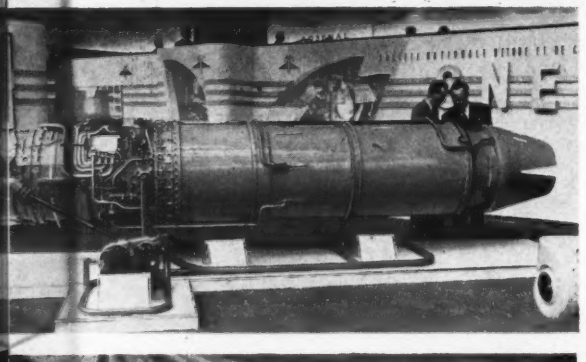
Neatest of the piston-engined trainers is the Piaggio P.148, a strikingly clean two/three-seater, and in all respects a worthy example of Italian workmanship. The canopy is especially neat. A top speed of 147 m.p.h. is claimed; the take-off run is 525 ft, and the stalling speed about 43 m.p.h. It is proposed to build this type in series in succession to the Fokker S.11, now being produced under licence by Macchi and I.M.M.

Of less refined aerodynamic design but, one gathers, promising to be a very serviceable

The S.O. Ariel III helicopter is one of the most promising exhibits in the Salon. The power unit is a Turbomeca Artouste gas turbine of 275 h.p.

(Below) The world's first jet trainer specifically designed for its task—the Fokker S.14, powered by a Rolls-Royce Derwent IX. The estimated maximum speed is 440 m.p.h. at 25,000 ft; at that height the maximum endurance (with 500 gall of fuel) is nearly 3 hr. The instructor and pupil are seated side by side in Martin-Baker ejector seats.

THE NINETEENTH PARIS SALON . . .



trainer, is the Morane-Saulnier M.S.731. Extensive use is made of spot-welding. The prototype shown has flown for about 200 hr; it has an Argus-Salmson 8A.S.02 engine and a fixed undercarriage. A later version has a Potez engine and a retractable undercarriage.

Fiat, as usual, display one high-powered and one low-powered trainer, respectively the Merlin-engined G.59-4B and the G.46, available with a D.H. Gipsy Queen or Alfa 115. A very high standard of workmanship is evident in the wing and undercarriage (the only components shown) of the new Fiat G.80 jet trainer, two versions of which (one with a Goblin 35, the other with a Nene) are proposed.

One of the most appealing machines in the Salon is the Ambrosini S.7 trainer, displayed as a single-seater, though a two-seater version is available. Provision is made for a 7.7 mm machine gun, a camera gun, and a reconnaissance camera. With a Gipsy Queen 30 engine a speed of 255 m.p.h. is attained. A version with swept-back wing and tail surfaces is projected.

The only research aircraft shown full scale is the ultra-high-aspect-ratio Hurel-Dubois H.D.10, the experimental forerunner of the twin-engined H.D.31 freighter. The H.D.10 will be remembered as a visitor to the R.Ae.S. Garden Party last year.

A gliding torpedo and an Arsenal jet-propelled target aircraft are among the military exhibits which will receive much fuller attention in our pages next week.

No commercial machines are displayed full scale (other than the fuselage of the Nord 2501 already mentioned) but a mass of information is available concerning new and improved types, including the S.N.C.A.S.E. Superarmagnac, to be powered with four Bristol Proteus or Allison turboprops.

Sporting and Touring Aircraft

STRANGELY enough, aircraft of the sporting and touring variety—usually exhibited in some profusion—are conspicuously absent from this year's Salon. While this can conceivably be attributed to the preoccupation of constructors with current military requirements, it is nevertheless disappointing to find such a poor showing of sporting machines. Though they are essentially military trainers, both the S.I.P.A. 200 (Turbomeca Palas) and the Fouga Lutin (two Palas) have possible civil applications and may, therefore, be briefly mentioned under this heading—they are more fully described in the preceding "military" section of these notes. Were it to be used for touring purposes, the S.I.P.A. 200 could be acclaimed as the first jet-powered two-seater sporting aircraft in the world.

Also to be seen is the Boisavia-Mercury four-seater, a typical private aircraft, simple but sturdy, having a fixed undercarriage and a reasonably low price. The performance conferred by its 140 h.p. Renault engine is attractive. If one excludes the experimental Escopette pulsejet-powered Emouchet sailplane (of which a second prototype is already flying, with six pulsejets), the M.B. 308 is the only other entirely private-owner type to be shown "in the flesh." Other constructors confine their exposition of light aircraft to models and photographs.

Helicopters

CERTAINLY one of the Show's most interesting exhibits—and one on which attention was constantly focused—is the S.O. 1120 Ariel III turbine-powered helicopter, constructed by S.N.C.A.S.O.; it is, in fact, the first machine of its kind in the world. The power unit is a Turbomeca Artouste of 275 h.p.; this is directly geared to a compressor which supplies air through the hub of the rotor to the small combustion chambers fitted at the blade tips. Orientation of the turbine exhaust by a number of small flux gates located at the rear of the fuselage, and operated directly by the rudder, gives full directional control. The use of these methods permits exclusion of costly and complicated transmission systems and tail rotors and, according to the Ariel's designer, M. Morane, will allow the machines to be produced at a price substantially below that of (for example) the Sikorsky S-51. Certainly this configuration would appear to be a great improvement on more conventional systems and all credit is due to S.N.C.A.S.O. for having evolved this promising machine. Batches have already been ordered by the French Air Ministry and Admiralty and large-scale production is to start next year.

The fearful-looking projectile in the uppermost picture is the French Navy's winged, air-launched torpedo. The wings are automatically shed on contact with the water. The turbojet below it is the Hispano-Suiza Nene with afterburner, a combination which delivers 6,500 lb of static thrust and which can be directly compared with the ATAR 101F (8,800 lb static) in the third photograph. Last is the Emouchet glider, with four S.N.E.C.M.A. Escopette ramjets, each of 22 lb thrust.

Another interesting type, to be found tucked away in a corner of the Grand Palais, is a home-made machine designated the Cantinieau-Betemps. It is a single-seat model with a piston-engine—mounted above the pilot's head—driving a conventional three-blade rotor. Its designer, M. Jean Cantinieau, told us that during the first flight, which has just been made, it performed very happily and was remarkably free from vibration. Its construction was achieved, entirely without outside financial assistance, by members of the Helicopter Society of France, of which M. Betemps (who assisted in the work) is the President.

Other helicopters on show include the Bristol 171 Mark III (noted for its pleasant handling characteristics) and a model of the 10/13-passenger 173 twin-rotor type, which is expected to fly shortly. Shown by its French licencee, and adapted with a special skid undercarriage of alloy tubing, is the standard Bell 47 D-1 agricultural type. Three models are exhibited of the S.N.C.A.S.E. 3120 general utility three-seater with a single rotor of three folding blades; it can be used for passenger, ambulance or agricultural duties. In this design the rotor is automatically disengaged by the centrifugal clutch in the event of engine failure. At the time of our inspection, last week-end, there appeared to be no sign of the Breguet 11E, either in model or photographic form.

Power Units

WHILE the Salon places severe limitations upon what (unless he resorts to models) the aircraft manufacturer can exhibit, power units can, on the other hand, be displayed to advantage; and, as has been the case for many shows past, Britain excels in this department. Last week we mentioned all the important engine exhibits from our own industry; the fact that we now write proportionately more about some of the French engines therefore requires no explanation. First, however, we must refer to the Rolls-Royce Avon upon the occasion of its public introduction, when thrust and consumption figures were given as 6,500 lb (2,950 kg) and 0.865 lb/hr/lb respectively. Constructional details of the Avon are still secret, but certain externally obvious features could be examined for the first time. For example, no fewer than eight blow-off valves are fitted around the axial compressor casing, and these are linked with a pneumatic ram which controls the pitch of the first row of static blades or guide vanes to be seen in the intake. This arrangement presumably has an important bearing upon high-altitude performance for which the Avon is especially noted. The "bullet" ahead of the front bearing contains the gas starter, and the supporting struts in the intake are attached tangentially to permit expansion.

No new information was released about other important units, such as the Armstrong Siddeley Sapphire or Double Mamba, although the French have confirmed their interest in the latter unit for both military and civil applications.

A word of praise must be accorded here to the wonderfully sectioned Bristol units, in particular the Proteus. We have never seen a more remarkable engine exhibit.

Also worthy of high praise is the United Aircraft Corporation's sectioned Pratt and Whitney Wasp Major. Contrasting in appearance (though not in quality) with this huge and complicated piston-engine is the sectioned D.H. Ghost as for the Comet. In this unit the rugged simplicity of the high-powered centrifugal turbojet with single-sided impeller is conspicuously revealed.

It is never easy to assess the progress or value, other than for research and experience, of the remarkable gas-turbine units which are produced in France. There is no doubt, however, that the Hispano-Suiza/Rolls-Royce licensing agreement is working excellently, and that the French company has done a fine job with Nene production (now understood to have run into hundreds), with the Tay, and with the design of afterburners for these turbojets. When the Tay is compared with the Nene beside it, the many differences are at once apparent. For example, though identical in layout and in overall diameter, the Tay has very different combustion chambers and a larger-diameter turbine.

The afterburner exhibited and illustrated here is Hispano's own work. It is fitted with a two-position variable-area jet nozzle, operated by pneumatic rams. The upper and lower hinges are so arranged as to preserve a truly circular outlet in either position. A rather shorter afterburner of greater diameter is being prepared for the Ouragan. Power increase at ground level, static, in both versions will be 30 per cent and at altitude and a representative speed 50 per cent, with specific consumption of 1.95 kg/hr/kg. Power loss due to pressure drop does not exceed 4 per cent, and the maximum power figure quoted is 6,500 lb (2,950 kg).

An all-French axial unit of striking appearance is the Atar 101F with afterburner—a S.N.E.C.M.A. project of 35 in (886 mm) diameter, immense length and rated at 8,800 lb (4,000 kg) maximum thrust. Three variants have been designed, the basic 101 with seven-stage axial-compressor (4.5 : 1 compression ratio) and annular combustion chamber; the 101E with water injection provided for, and the 101F with afterburning as well. The Atar 101 has passed some official test runs and a version is to fly in an

Salmson's nine-cylinder 200 h.p. helicopter unit with fan cooling is known as the Model 9NH. The weight is 360 lb.

Ouragan at the display on July 1st. Production has been ordered. Normal take-off thrust is 6,170 lb (2,800 kg) and for maximum cruising it is 5,000 lb (2,300 kg) with specific consumption of 1 kg/hr/kg.

The same constructional group S.N.E.C.M.A., again exhibit their slim, attractive turboprop, the TB.1000 of 1,450 s.h.p., and mention is made of the 1000A giving 2,000 s.h.p. for take off. However, these units are still in the development stage. The 14X, a small two-row radial, is in the 800 h.p. class and both civil and military versions, differing in altitude rating, are to be produced.

In the very-small-turbine field Turbomeca have a whole series of unique little units which demonstrate the possibilities of perfecting a simple design and then scaling it up (or presumably down within limits). The company's 200 lb (100kg) thrust Piméné is becoming well known, while later units—the 330 lb (150 kg) Palas and the Marbore 1 and 2 of 660 lb (300 kg) and 840 lb (380 kg) thrust respectively, have each completed successfully some hundreds of hours of running. The little Piméné is, of course, flying in several primary and lately, auxiliary power unit applications. Its specific consumption is 1.08 kg/hr/kg.

Sharing basic design features, but having "double-flux" or secondary, by-passed air flow is the 485 lb (220 kg) Aspin 1. And, related again, are the two turboprops—the 160 h.p. Oredon and 275 h.p. Artouste—and, finally, several auxiliary groups for pressurization and so on, among them the Pimedon and Palouste.

Few of the smaller piston-engines shown in Paris are new, although Salmson's 200 h.p. nine-cylinder radial for helicopters is an exception. This is designed for vertical mounting, and has fan cooling. Blackburns, of course, show the 185 h.p. Cirrus Bombardier, which in some installations—the Skeeter, for example—is to do similar work to that of the Salmson. The Bombardier 702 has S.U. fuel-injection and tidied-up accessories. It is approved with Rotol C.S. airscrew. Potez and Minié again show a large variety of units, and once more, apparently unchanged, the ingenious one-off Lutetia 6-cylinder 12-piston radial appears.

Certain unconventional units are to be found in the Salon, although little information is forthcoming about them. For example, among the Arsenal exhibits (incidentally, the vast French-built Jumo and 24H units are again displayed but are more of academic and shipping interest) is a V.1-like pulse-jet giving 330/420 lb (150/190 kg) thrust, and a "stato-propulseur"—an athodyd of just under 20 in (500 mm) diameter and to give 1,100 lb (500 kg) thrust at 620 m.p.h. (1,000 km/hr). It comprises the shaped duct and a grid carrying twelve sprays or burners.

Last to be mentioned among the unconventional jets, but by right first in the interest it has caused, is the Escopette (S.N.E.C.M.A.), an auxiliary pulse-jet with no moving parts, baffling in detail of operation and resembling a combination of organ pipe and walking-stick. Readers will recall earlier references to the Escopette when examples first flew in the Emouchet glider. The weight of the equipment and mounting complete is 11.2 lb (5.1 kg), and the maximum thrust 22 lb (10 kg), although up to 40 lb (18 kg) have been produced with improved materials.

According to the fuel-delivery pressure, thrust and specific consumption vary between 6.5 and 22 lb, and 2 and 5.5. grm/kg/sec respectively. Starting is automatic with the aid of a miniature sparking-plug. Diameter and length are respectively 6.18 in (157 mm) and 113.3 in (2,880 mm). Much of the duct behind the combustion chamber operates at red heat, and the frequency of combustion is 100 impulses/sec (compared with 40 impulses/sec for a V.1). Needless to say, the resultant noise is tremendous.

FROM ALL QUARTERS

Woomera Appointments

LEUTENANT-GENERAL JOHN EVETTS, who selected the Woomera Rocket Range and pioneered its organisation, has completed his Australian mission and is returning to Britain, according to a report published in Melbourne last week.

With his retirement the administrative direction of the range will pass from military planners to field scientists. Lt.-Gen. Evetts will be succeeded, as head of the Ministry of Supply contingent, by Mr. Ivor Bowen, M.Sc., F.R.Ae.S., A.M.I.E.E., a scientist who arrived in Australia last year. He was formerly Chief Superintendent of the A. and A.E.E. and, incidentally, a founder-member of the Cambridge University Air Squadron.

The Commonwealth Supply Department's Chief Scientist, Mr. William Alan Butement, has already taken over as principal controller of the project.

An illustrated article on the Woomera Range appeared in *Flight* of April 13th last.

A. Cdre. Harvey as H.P. Director

IT is announced that A. Cdre. A. Vere Harvey, C.B.E., M.P. has been elected a director of Handley Page, Ltd. Conservative Member of Parliament for the Macclesfield Division of Cheshire since 1945, the air commodore is vice-chairman of the Party's Civil Aviation Committee, and his pertinent Parliamentary questions, clearly based on practical knowledge, have been the means of securing or hastening official action on a great variety of aviation matters, both Service and civil. A.Cdre. Harvey served in the R.A.F. from 1925 to 1930 and from 1939 to 1945 and commanded No. 615 (County of Surrey) R.Aux.A.F. Squadron in France during the first year of the war. He holds, among other directorships, seats on the boards of Mullard Electronic Products, Ltd., and Westminster Airways Servicing, Ltd. In 1930-1935 he was manager, and a director, of the Far East Aviation Co.

A. Cdre. Harvey

New Duties for Mr. A. N. Spriggs

CONCURRENTLY with the taking-over of the extensive Squire's Gate, Blackpool, factory to assist in Hawker production, comes the announcement that Mr. A. Neville Spriggs, O.B.E., has been appointed general manager of Hawker Aircraft, Ltd. In his new capacity he will, of course, be closely concerned with the additional production-capacity, and will divide his time between Squire's Gate and the existing factories at Kingston-on-Thames and Langley. Last Tuesday he was due to be flown north by S/L. Neville Duke in company with Sir Frank Spriggs and other Hawker Siddeley Group executives, where the party were to lunch with the Mayor and corporation of Blackpool.

Mr. Neville Spriggs

Mr. Neville Spriggs, who is 51 years of age, began his career with the Sopwith Aviation Co., and when that concern ceased production and the H. G. Hawker Engineering Co. started building aircraft, shortly after the first world war, he began a steady advancement in responsibility, always on the practical engineering side. He eventually became chief process engineer and, in 1942, works manager. This was when the peak production of 240 Hurricanes a month had been achieved, and Mr. Spriggs was made an O.B.E. in recognition of the part he had played in achieving that result. He was appointed deputy general manager in the same year, and in 1945 became a director.

Incidentally, the opening of the Squire's Gate factory was the subject of a question in the House last Thursday by Kingston's M.P., Mr. J. Boyd-Carpenter. He asked whether the President of the Board of Trade had satisfied himself that no redundancy would occur in Kingston as a result. Sir Hartley Shawcross replied that Squire's Gate had been allocated to the company to enable them to increase production, and he understood that they intended to use their existing capacity and labour at Kingston to the fullest extent.

THE TIME BY BIG BEN, 7.17 a.m. The day, last Sunday. The flying-boat, the Saunders-Roe S.R.A/1, just being brought to her mooring off the South Bank Exhibition for Gas Turbine Week, organized by Power Jets (Research and Development), Ltd., and now in progress. She had previously been flown from Cowes by Geoffrey Tyson and set down on the Thames in Woolwich Reach. Also on show are two Naval gas-turbine-powered craft and a special feature is made of the gas-turbine exhibits at the South Bank. The number on the tail of the S.R.A/1, incidentally, is one of those allotted to constructors by the S.B.A.C.

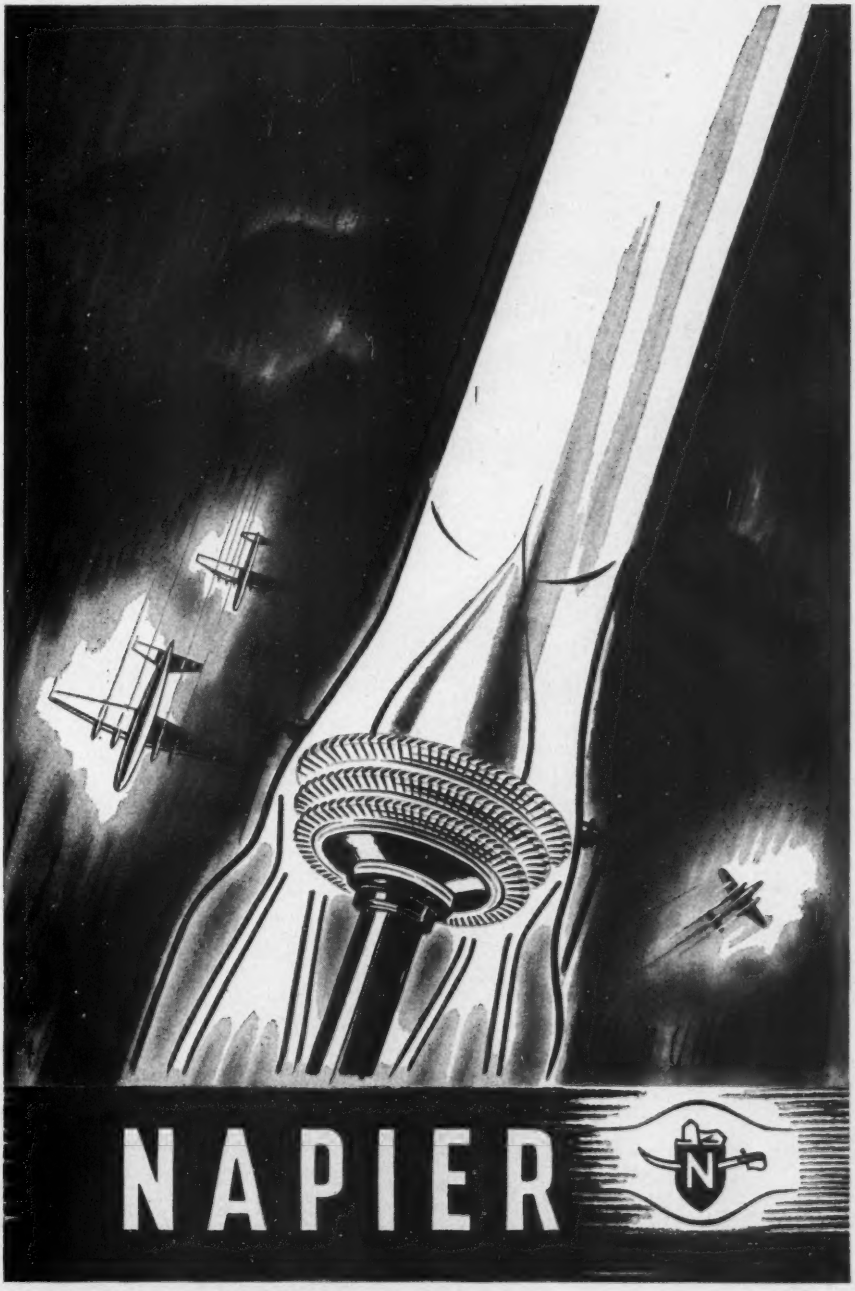
The Bell X-5

TESTS are imminent at Muroc with the Bell X-5 transonic research aircraft, the wing of which can be varied in its degree of sweepback during flight. In layout the machine bears a very marked resemblance to certain German fighter projects, though these machines were not intended to embody variable sweepback. Unlike the Bell X-1, the X-5 has turbojet, not rocket, power.

Automatic Control

AN international conference on the theory and use of automatic control (in the widest sense) is to be held from July 16th to 21st at the College of Aeronautics, Cranfield, Beds. Papers will be read by scientists from Canada, France, Germany, Holland, Sweden, and the U.S.A., as well as from Great Britain. It is stated that no mention of the use of automatic control of weapons will be made at the conference, which is being held under the aegis of the Department of Scientific and Industrial Research, Charles House, 5 to 11, Regent Street, London, S.W.1.

CO-OPERATIVE VISIT: The Netherlands Air Attaché recently visited the Gloster works at Hucclecote. In this group are (left to right) Capt. Vijzlaar, test pilot; adjt. Franscen, Netherlands Air Force; Lt-Col. C. J. M. Naas, the Air Attaché; and Mr. H. Service, foreign sales.



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HERE AND THERE

Australia's New Air Minister

IN the new Australian Cabinet, Mr. P. A. McBride is Minister for Air as well as Minister for Defence and for the Navy. Mr. H. L. Anthony is Minister for Civil Aviation and also Postmaster-General. As already announced in these pages, the former Air and Civil Aviation Minister, Mr. T. W. White, is coming to this country as Australian High Commissioner.

New Airlift?

A SHARP increase in parcel airmail out of Berlin last week suggested the commencement of a new airlift. The reason was the holding up of some 1,400 West Berlin export consignments as a result of a dispute with the Soviet authorities over Berlin's trading rights with the West.

Viscount Orders

IN his address at the recent general meeting of Vickers, Ltd., Lt.-Gen. Sir Ronald Storrs (chairman) said that, in addition to the B.E.A. order for Viscounts, the contracts to supply similar aircraft to Aer Lingus and Air France were now being finalized and that "further demands are not unlikely."

All's Well . . .

A FIRE which occurred in the port outer engine of a B.O.A.C. Stratocruiser, five minutes after it had taken off from London Airport on Wednesday of last week, failed to submit to the aircraft fire-suppression equipment. The pilot asked for an emergency landing and seven airport tenders dealt effectively with the matter.

High-Speed Buyer

A LONDON firm of car agents, Tankard and Smith, Ltd., are finding that it is no more expensive, and certainly quicker, for their sales manager to fly himself round the country (to examine and purchase cars) than to travel by road or rail. Not only is valuable time saved, they say, but a wider market has been opened up.

Ice Destroys Eight

THE recent simultaneous crash of eight F-84 Thunderjets, shortly after they had taken off from Wright-Patterson field, Dayton, has been found to have been due to icing of air-intakes. "There was no indication of sabotage," says the U.S.A.F. and F.B.I. committee which investigated the accident. Three of the pilots lost their lives; the others escaped by parachute.

Aeromodellers' Classic

ONE of the classic events in the model aeronautical calendar is due to take place next Sunday, June 24th, when, starting at 10 a.m., the Northern Heights Model Flying Club holds its gala day at Hawkers' airfield, Langley, near Slough. The programme will include the annual contest for the Queen's Cup, limited to rubber-powered duration models of specified wing area, weight and fuselage cross-section.

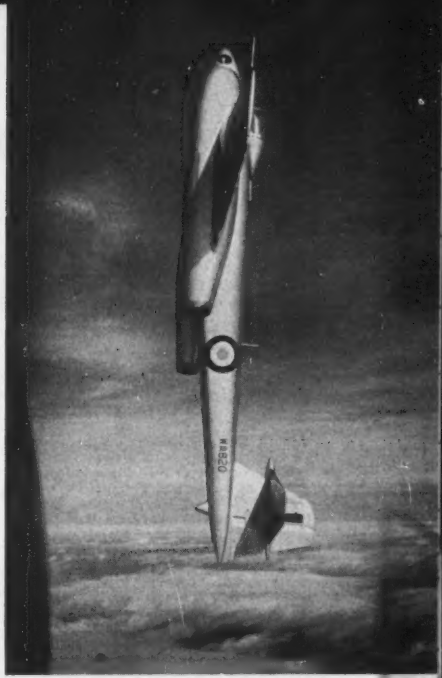
Compact Compass

A NEW stand-by compass, the E2A, developed by the Admiralty Compass Observatory at Slough for the Ministry of Supply, weighs only 3 oz. and is little larger than a golf ball; its case is of transparent plastic material, and a new silicone fluid is used instead of alcohol. Designed for installation in modern high-speed aircraft, where electrical and metallic interference may be high and stowage-space small, the new instrument is being put into production by Kelvin and Hughes, Ltd.

Unwilling Guests

TWO F-84 Thunderjets based in Bavaria landed last week near Prague during a training flight; it is thought that they had lost their way. The pilots, one a Norwegian and the other an American being trained in Germany under the military assistance programme, were detained by the Czechs. The incident echoes the landing, reported recently in these columns, of a Russian pilot in the French sector of Berlin—with the difference that the Russian realized his mistake in time, and got away.

NON-VITAL HIT: What one cannon-shell from a Mig-15 can do to a nacelle-fillet and flap of a B-29. Fortunately the damage was mainly confined to the skin, the internal structure escaping. The picture was taken recently in North Korea.



IN THE ASCENDANT: Though closely resembling Mr. Russell Adams's earlier vertical-climb studies, the subject of this new picture is actually of a Meteor powered experimentally with two Armstrong Siddeley Sapphire turbojets. In level flight it can attain its limiting Mach Number with only one Sapphire running.

IN BRIEF

FOLLOWING the acquisition of extended premises at Croydon Airport, W. A. Rollason, Ltd., have closed their repair depot at Eastleigh, Southampton.

* * *

Paris Show visitors are already finding good use for the new pocket-size English-French, French-English aeronautical glossary lately issued by Rotol, Ltd.

* * *

A new edition of *Engineering Education in the Region* (London and Home Counties) has been published, price 1s., by the London Regional Advisory Council, Tavistock House South, London W.C.1.

* * *

Mr. Basil C. Hawke states that he has resigned his post as chief designer (aircraft division) at Western Manufacturing Estate, Ltd., in order to join F. G. Miles, Ltd., Redhill, in a design capacity.

* * *

Rotax, Ltd., state that they are the first firm to receive approval under the design-approval scheme for aircraft instrument and electrical equipment announced by the M.O.S. last year.

* * *

In connection with the accident to a Wyvern near Boscombe Down on June 8th, in which Lt. Cdr. Hansen lost his life, the M.L. Aviation Co., Ltd., state that the ejection seat used was not of their design or manufacture.

* * *

In issuing a list of its committee-members (reproduced in *Flight* of June 1st) the R.Ae.C. inadvertently described Mr. F. Rowarth as senior handicapper; in fact, that officer is Mr. D. J. Lyons, while Mr. Rowarth is the consultant.

FESTIVAL AIR RACE WHO'S WHO

Some Biographical Notes on the Pilots Due to Compete at Hatfield Tomorrow

LAST week—in order to give intending visitors time to make their plans in advance—we published a guide to the Festival of Britain 1951 Air Races, to be flown at Hatfield tomorrow, June 23rd. Details of the course, admission prices, etc., were given, together with complete lists of entrants, pilots, aircraft and engines.

Further details of the flying display items are now available. Lorne Welch and Donald Brown are to execute sailplane aerobatics; C. T. D. Hosegood will demonstrate a Bristol Sycamore helicopter; the Patrouille d'Etampes will give another of its renowned displays; F/O. Murphy (Meteor 8, No. 66 Sqn.) will perform individual aerobatics; Prince Cantacuzene (Bücker Jungmeister) will repeat the low-altitude display which caused a sensation at the recent Swansea meeting; instructors from No. 226 Operational Training Unit will perform Meteor team aerobatics; and there will be a parachute spot-landing competition.

Exact times of these demonstrations, and of the races, are not finally decided, but it is certain that the first event will be the King's Cup Race, starting at 1.30 p.m.

The final of the R.Aux.A.F. Cooper Trophy Race will not now take place. The Air Ministry states that it has been cancelled in order not to interfere with the Auxiliary squadrons' three-month continuous-training period.

Below, to complete the picture, are personal notes on the pilots in the races. It will be seen that a few racing numbers are duplicated; the reason is that half-a-dozen aircraft which are competing in the high-speed events are not entered for the King's Cup and the races being run concurrently with it, and they are numbered independently of the main King's Cup list.

Apart from considerations of space, omission of details as to distinguished war records, and so forth, does not necessarily mean that those concerned have no such records—merely that they have not supplied full details to the Royal Aero Club, to whom we are indebted for the bulk of the information given.

Aitken, G/C. the Hon. Max (No. 88, Gemini): Son of newspaper-owner Lord Beaverbrook, Max Aitken was commissioned in No. 601 Aux.A.F. Sqn. in 1939 and had a distinguished record as a war pilot. Conservative M.P. for Holborn, 1945-49; is a London Express Newspapers director.

Alexander of Yugoslavia, H.R.H. Prince (No. 81, Proctor): This 27-year-old royal enthusiast served in the R.A.F. during the war. He is competing in the King's Cup and Kemsley Races.

Ashton, J. H. (No. 57, Hawk Trainer): A 37-year-old private owner from Staffordshire.

Basnett, J. T. (No. 63, Hawk Trainer): Learned to fly at Denham in 1948; 25 years old, lives at Iver, Bucks.

Bates, R. W. (No. 14, Hornet Moth): To pilot one of the two now-rare Hornet Moth enclosed-cockpit biplanes in the King's Cup.

Bennett, D. J. (No. 76, Proctor): A 30-year-old engineer who learned to fly at Cambridge in 1946.

Bishop, C. A. Nepean (No. 49, Hawk Trainer): Aged 50, and affectionately known as "The Bishop of Redhill," is an instructor there. Has competed in the last two King's Cup Races, and other events.

Bowles, W. P. (No. 35, Messenger): Company director, learned to fly at London Aeroplane Club in 1935; fairly consistent air-race competitor.

Broomfield, D. J. P. (No. 15, Autocrat): Handley Page (Reading) test pilot; has taken over aircraft to have been flown by W/C. J. D. H. Slade.

Brown, J. K. (No. 50, Moth Minor Coupé): Was an Aux. A.F. instructor in 1939; flew throughout war; took three-year course at D.H. Technical School, then was appointed instructor at No. 1 E.F.T.S., Panshanger..

Bullen, G. F. (No. 41, Miles Whitney Straight): A Hawker test pilot; flew in last year's *Daily Express* Race.

Butler, A. S. (No. 45, Leopard Moth): 53-year-old de Havilland ex-chairman; private owner since 1919. Second in King's Cup, 1930.

Cole, A. L. (No. 51, Comper Swift): Flies one of the two remaining examples of these speedy little pre-war monoplanes. Formerly at D.H. Technical School, now with English Electric. Third in 1949 King's Cup, second in 1948 Siddeley Trophy. Holds 100 km closed-circuit record in Class C.1a at 126.22 m.p.h.

Colquhoun, L. R. (No. 2, Spitfire 22): Vickers-Supermarine test pilot; holds amphibian 100 km closed-circuit record (Seagull, 241.88 m.p.h.); awarded George Medal in 1950 for landing damaged Attacker safely.

Coltman, A. E. (No. 44, Hawk Major): Learned to fly at the Midland Aero Club in 1929.

Cooper, J. (No. 47, Moth Minor): 51 years old, served in R.F.C. and R.A.F. in World War I.

Cotter, D. G. S. (No. 10, Autocrat): An ex-A.T.A. pilot, is one of the dozen Londoners in the King's Cup Race.

Crammond, Lt. Cdr. J. G. (No. 82, Hendy Heck): Private owner and member of R.Ae.C. committees; served in Fleet Air Arm during war. Flew in 1949 King's Cup. His Heck is the only one extant.

Cunningham, G/C. J. (No. 3, Vampire N.F.10): D.H. chief test pilot since 1946, and has been responsible for most of Comet test flying. Learned to fly with No. 604 Sqn. at Hendon in 1936 and later commanded it; night-fighter pilot during war; gained height record (Vampire, 59,446ft) in 1948.

Curtis, Miss E. L. (No. 48, Wicko): Learned to fly at Ford in 1937; served in A.T.A. during war, and was first woman to fly four-engined aircraft; M.C.A. operations officer, 1946-48; now on technical staff (civil aircraft testing), Boscombe Down.

Dawson, C. D. (No. 34, Hawk Trainer): Aged 27, lives at Edgware, Middlesex.

Day, E. (No. 68, Hawk Trainer): 25-year-old Kentish farmer and last year's King's Cup winner. Also flew in *Daily Express* Race last year.

Derry, S/L. J. (No. 4, Venom): D.H. experimental test pilot since 1947. Joined R.A.F. as W.Op/AG.; commanded No. 182 Sqn. in 1945; was Vickers-Supermarine test pilot in 1946-1947; gained 100 km closed-circuit record (D.H.108, 605 m.p.h.) for Britain in 1948; second in S.B.A.C. Race last year.

de Vere, C. J. (No. 69, Hawk Trainer): Learned to fly at Shoreham and Weston in 1947; is now a student at the College of Aeronautical Engineering.

Donaldson, G/C. G. F. K. (No. 5, Taylorcraft): Learned to fly in 1935. Lives at West Kirby, Cheshire.

Duke, S/L. N. F. (No. 26, Tomtit): Hawker's chief test pilot, well versed in "swept-back jettery", but equally happy to be racing a pre-war biplane. Was Fighter and Boscombe Down pilot. Holds London-Karachi record in Sea Fury; won 1949 Kemsley Trophy, third in 1950.

Dunkerley, F. (No. 94, Gemini): This 46-year-old managing director of a Lancashire cotton mill has been one of the most consistently successful racing pilots during recent years. His latest capture was the Goodyear Trophy a month ago.

Fillingham, W. P. I. (No. 56, Chipmunk): Chief production test pilot at D.H. Joined them in 1940, tested D.H. types in Canada. Won Tiger Moth race at Lympne, 1948, and has flown in previous King's Cup contests.

Foster, Maj. W. L. (No. 36, Hawk Trainer): At 55, the oldest pilot competing; engineer by profession, learned to fly at Hanworth in 1939.

Franklin, W. T. (No. 58, Gemini): Aged 38, lives at Enfield, Middlesex.

Freeman, K. M. (No. 52, Hawk Trainer): Competed in *Daily Express* race last year.

Gillman, Capt. R. E. (No. 3, Avian): 30-year-old pilot of a 21-year-old aircraft.

Grace, Mrs. Y. M. (No. 8, Taylorcraft): A club pilot believed to be new to air racing; lives at Codicote, Herts.

Hayhow, T. W. (No. 27, Aiglet): A marine engineer of Middlesbrough; has competed in several races.

Hilton, T. R. (No. 54, Chipmunk): Learned to fly at London Aeroplane Club in 1949.

Hughes, F/L. E. S. (No. 2, Moth): Serving officer (R.A.F. Station Jurby); is flying one of oldest aircraft in the King's Cup.

Hull, P. M. A. (No. 4, Moth): Scotland's only representative in this year's King's Cup. His Moth, G-ABAG, is believed to be the oldest aircraft in the race.

Irwin, Mrs. Zita (No. 75, Proctor): Pilots the Windmill Theatre's Proctor. Learned to fly at Hatfield in 1939, served in A.T.A. during war.

James, Dr. W. L. (No. 1, Chilton): Only "ultra-light" exponent in the Races; learned to fly at Reading in 1930.

Jamieson, R. W. (No. 46, Leopard Moth): Learned to fly in New Zealand; was an instructor at Luton; is now D.H. production test pilot.

Jemmett, D. C. (No. 39, Hawk Trainer): A company director who learned to fly at Wolverhampton in 1947 and has consistently competed in races since.

Lashbrook, W. I. (No. 79, Proctor): Chief pilot and operations manager, Lancashire Aircraft Corporation. Joined R.A.F. as apprentice in 1927 and learned to fly in 1937. Shot down in 1943 but evaded capture. Has flown 150 types. Consistent race competitor, and won Air League Cup at Sherburn last year.

Lawrence, P. G. (No. 38, Messenger): Chief test pilot, Blackburn and General Aircraft, Ltd. Joined Fleet Air Arm in 1939, served in Swordfish squadrons, 1940-42; Naval Service Trials Unit, 1942-45; E.F.T.S., 1945. Won 1949 Air League race in a Firebrand.

Lithgow, M. J. (No. 5) Attacker): Vickers-Supermarine test pilot. Learned to fly at R.A.F. Reserve School, Gravesend, but served as Naval pilot during war. Secured 100 km closed-circuit record for Britain in 1948 (Attacker, 565 m.p.h.); won S.B.A.C. Cup in Attacker last year.

Little, Dr. D. F. (No. 66, Vega Gull): A private owner who regularly participates in Continental rallies in his Vega Gull.

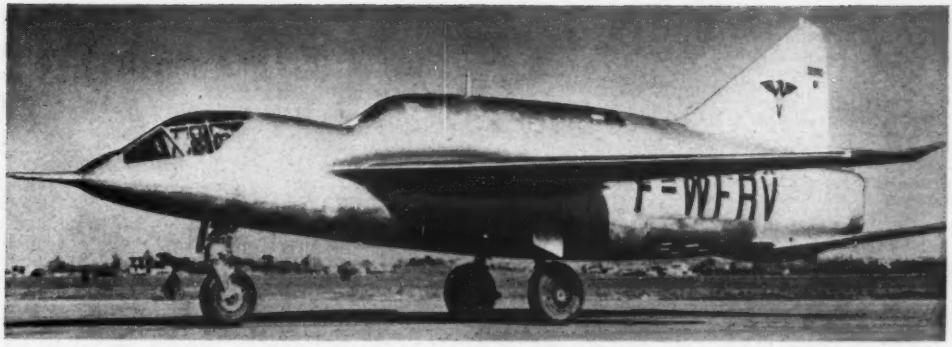
Marler, G. C. (No. 31, Falcon Six): "Flying business-executive" from New Zealand. Competed in 1949 Thruxton Races and 1950 King's Cup.

Matthews-Naper, R. (No. 33, Messenger): 31-year-old Australia-born farmer, lives in Eire, is flying Irish-registered aircraft.

Meille, Col. Enrico (No. 98, Ambrosini): The only entry received from abroad; the performance of his Ambrosini S.7—a type about which little is known here—in the Kemsley Trophy will be watched with interest.

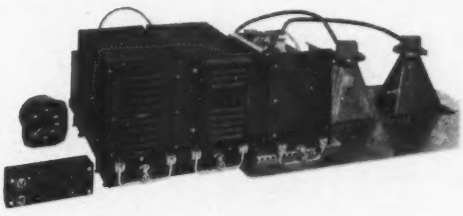
Millican, K. C. (No. 74, Proctor): A consistent performer at flying events in the Newcastle-on-Tyne area; won the Grosvenor Cup Race when it was flown there last year.

(*Continued on page* 732)

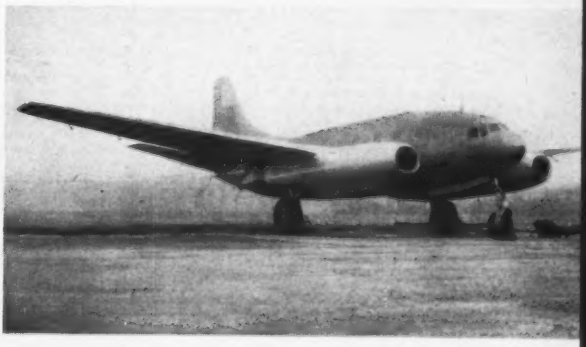


PRESENTED IN PARIS

Exhibits on Show in the Grand Palais or to be Displayed at Le Bourget



ILLUSTRATED here are French and Dutch aircraft, and one important item of British equipment, now on view in the Paris Salon or due to appear at Le Bourget next week. At the head of the page is the S.E.2415 prototype, with two Hispano-Suiza Nenes staggered, one above the other, within its massive fuselage. This type may be developed either as a heavy fighter or as a light bomber, and is dubbed "Grognard" (i.e., a member of Napoleon's Old Guard). Below this remarkable French prototype is Standard Telephones and Cables' radio-altimeter Type S.T.R.30—frequency-modulated and capable of recording the height of an aircraft during all stages of an approach down to the time when the wheels touch the runway. The maximum height recorded is 5,000ft; the minimum, 3ft. Then comes the Rolls-Royce Derwent-powered Fokker S.14 jet trainer, which has side-by-side ejector seats and many other features to commend it to prospective buyers. The helicopter at lower left is the S.O.1120 Ariel III, which made its first flight on April 19th; it has a gas turbine which feeds propulsive ducts at the blade-tips. Finally, there is the experimental Nene-powered S.O.30—France's counterpart of our Nene-Viking.



BIRTHDAY HONOURS

Further Names of Service Personnel and Civilians

BELOW, additionally to the list which we published last week, are names (Service and civilian) of those figuring in the Birthday Honours List. They include (immediately below) the remaining R.A.F., R.Aux.A.F. and W.R.A.F. awards; honours and awards to personnel of the Commonwealth air forces; and civil M.B.E.s and B.E.M.s.

ROYAL RED CROSS (Second Class)

Flt/O.s M. M. McLaren and G. E. K. Walker, Princess Mary's Royal Air Force Nursing Service.

AIR FORCE MEDAL

F/Sgts. G. Acklam, J. S. Cadden, E. A. Corbett, N. Cross, E. Davies, J. A. Eliston, G. W. Ford, L. F. Gapper, W. E. Lowther, W. J. McCausland, R. J. McFadden, D. G. Munro, R. J. Snell.
Sgts. C. R. Colkin, F. C. Slee.

BRITISH EMPIRE MEDAL (Military)

F/Sgts. R. O. A. Abbott, R. H. Colyer, J. W. Craig, C. E. Erskine, G. T. Griffiths, A. J. Hammond, G. J. W. Hare, F. A. Hawkins, R. F. Hewlett, T. G. James, H. Miller, W|R.A.F., W. O. Morgan, J. P. Oxley, E. F. Townsend, F. Young, C. D. Collyer, J. A. Taylor.
Sgts. G. R. Dawes, L. Dowdeswell, W.R.A.F., E. G. Ellis, F. G. Froud, N. G. Kelly, A. McIvor, H. R. Thomas, W. E. Weatherill, E. C. Dunn.
Cpls. E. A. Chapman, W. P. Megraw, B. P. Rowden, S. H. D. Seek, L. C. Thurston.

KING'S COMMENDATION FOR VALUABLE SERVICE IN THE AIR

G/C. B. J. R. Roberts.
W/C. A. D. Forster.
S/L.s H. D. Archer, R. S. Radley, G. Hampton.
F/L.s R. Allen, D. L. Arthy, A. J. Couchman, E. A. J. Haskett, J. B. F. Keddie, P. G. Marman, D. C. Matheson, W. O. Mitchell, H. G. Munday, J. Netherwood, A. J. R. Robson, E. M. Sparrow, S. Wilkinson.
F/O.s R. G. Bainbridge, P. W. Gee, W. G. Woods.
F/Sgts. J. H. W. King, J. S. Muir, W. W. Simpson.
Sgts. N. C. Bennett, L. G. Revell, R. F. Stacey.

COMMONWEALTH AIR FORCES ORDER OF THE BATH

C.B.

A.V-M. E. C. Wackett, R.A.A.F.

O.B.E.

G/C. H. G. Acton, R.A.A.F.; W/C. N. Ford, R.A.A.F.; S/L. G. Goetz, R.N.Z.A.F.

M.B.E.

S/L. J. Mann, R.A.A.F.; F/L. W. J. Ryan, R.A.A.F.; F/L. O. Studley, R.A.A.F.; F/L. G. A. L. Webby, R.N.Z.A.F.; W/O. M. M. Bentley, R.N.Z.A.F.

BAR TO AIR FORCE CROSS

S/L. K. V. Robertson, R.A.A.F.

AIR FORCE CROSS

F/L. J. M. Cairns, R.A.A.F.; Capt. H. Hawkins, S.R.A.F.; F/L. J. W. Hubble, R.A.A.F.; F/L. D. M. Hutton, R.N.Z.A.F.; W/O. A. A. Swinbourn, R.A.A.F.

BRITISH EMPIRE MEDAL (Military)

F/Sgt. D. E. Harris, R.N.Z.A.F.; Cpl. C. J. Lennox, R.N.Z.A.F.

ADDITIONAL CIVIL HONOURS ORDER OF THE BRITISH EMPIRE

M.B.E. (Civil)

Miss H. C. Adams, higher executive officer, M.C.A.; G. Alley, assistant production engineer, Air Ministry, Cardington; E. L. Baddeley, senior executive officer, M.C.A.; M. Butter, chairman of committee, No. 398 (Staines) Squadron, A.T.C.; H. D. Cumming, chairman of committee, No. 95F (Crewe) Squadron, A.T.C.; T. H. Endersby, chief executive officer, M.O.S.; C. M. Francis, furnishings buyer, N.A.A.F.I.; F. Gardiner, Commandant, No. 4 Group (Oxford), R.O.C.; C. W. Hooton, chairman of committee, No. 204 (Lincoln) Squadron, A.T.C.; G. Maclaren Humphreys, senior experimental officer, A. and A.E.E.; N. Jerram, engineer superintendent, B.O.A.C.; J. C. Kirkpatrick, chief welfare officer, English Electric Co., Ltd., Liverpool; N. McInnes, Inspector of Works (Mechanical and Electrical), R.A.F., Henlow; W. C. Meredith, foundry manager, Hadfields, Ltd., Sheffield; F. Mitchell, flight radio officer, B.O.A.C.; E. Newton, chief investigating officer, Accidents Investigation Branch, M.C.A.; N. M. Richards, head of Photographic and Reproductions Branch, Air Ministry; E. P. Stevens, works manager, Martin Baker Aircraft Co., Ltd.; H. W. Turner, senior executive officer, M.O.S.; H. Wilcox, senior executive officer, Air Ministry.

BRITISH EMPIRE MEDAL (Civil)

A. Appleby, shop convenor, Rolls-Royce, Ltd., Derby; R. T. Arkley tool maker, Projectile and Engineering Co., Ltd., Battersea; T. F. Bray, blacksmith, R.N. Air Station, St. Merryn; S. W. S. Cockram, works inspector, Treforest Repair Base, B.O.A.C.; H. L. Davies, toolroom grinder, Folland Aircraft, Ltd.; H. P. Day, works technical grade III, R.A.E., Farnborough; E. Hopkins, Civil Warrant Officer, No. 254 (Aberdare) Squadron, A.T.C.; J. S. Howarth, foundry chargehand, Magnesium Elektron, Ltd.; F. H. Lax, band sergeant, Queen Victoria School for the Sons of Scottish Sailors, Soldiers and Airmen, Dunblane; F. A. Lovett, superintendent, insulation factory, B.T.H., Ltd.; A. P. Morris, station warden, R.A.F., Changi, Singapore; G. Murray, foreman of trades (armourer), No. 12 M.U., R.A.F., Kirkbride; A. J. Puttock, works technical grade II, R.A.E., Farnborough; H. R. G. Reeve, station engineer, A.I.D. Test House, Harefield; W. Shakespeare, dopeshop foreman, Percival Aircraft, Ltd.; J. W. Winterson, chief paper keeper, Air Ministry; J. Young, traffic superintendent, No. 14 M.U., R.A.F., Carlisle.

Festival Air Race Who's Who

(*Continued from page* 730)

Murphy, S/L. F. (No. 1, Sea Fury Trainer): Hawker chief production test pilot. Learned to fly with R.N.Z.A.F. and was fighter pilot. Third in 1949 Kemsley Race and 1950 Air League Race.

Ogilvy, D. F. (No. 55, Hawk Trainer): At 22, is this year's youngest competitor. Learned to fly in R.A.F. Competed in National Air Races last year.

Oliver, A. Cdre. J. (No. 84, Mercury): At 53, a veteran pilot who has flown 150 different types since he taught himself on a Déperdussin in 1915. A consistent air-race competitor, he is Goodyear's aviation manager. Was lately appointed Deputy Lieutenant of Staffordshire.

Paine, R. R. (No. 96, Hawk Speed Six): Director of Air Schools, Ltd., Wolverhampton. Learned to fly in 1936 and served from 1940 to 1945 as chief engineer to E.F.T.S. (later R.F.S.) at Wolverhampton. Is a consistent place-winner in air races, and holds 100 km closed-circuit record in Class 1b at 192·83 m.p.h.

Purvis, G/C. H. A. (No. 64, Proctor): Learned to fly at Cranwell in 1924, retired from R.A.F. in 1946; is now chief civil test pilot at Boscombe Down.

Raymond, F/L. P. (No. 30, Hawk Trainer): Serving officer; was third in last year's *Daily Express* Race.

Reiss, P. Q. (No. 12, Hornet Moth): Well-known 54-year-old private owner and member of R.Ae.C. committees; is flying an increasingly rare type.

Rush, S/L. J. (No. 95, Falcon Six): Learned to fly at Newcastle-on-Tyne in 1929. Won 1938 Manx Air Derby and 1950 Norton-Griffiths Race, and placed in several other events. In R.A.F. 1939-46.

Sauvage, J. H. (No. 70, Proctor): Chief pilot Eagle Aviation, Ltd. Was a Bomber Command pilot and Pathfinder during war, and was subsequently in Transport Command. Later was with Silver City Airways, Skyways, and Shell in Ecuador.

Scrope, H. E. (No. 97, Mew Gull): Is employed by Vickers-Armstrongs, Ltd. The Mew Gull he is flying is the aircraft in which Alex Henshaw won the 1938 King's Cup.

Sharp, M. (No. 59, Chipmunk): D. H. public relations manager since 1935; was formerly an aeronautical journalist. Learned to fly at London Aeroplane Club in 1934.

Smith, W/C. M. A. (No. 60, Gemini): Is racing G-AFLT, the Gemini owned by *Flight*, of which he is Editor. Joined O.U.A.S. in 1934, received technical training with Rolls-Royce, and served in R.A.F. 1939-45 as flying instructor and, later, in No. 5 Group as a Pathfinder and Master Bomber.

Somers, J. N. (No. 90, Gemini): Like Dunkerley, a company director and Gemini owner, who has been consistently successful in air racing. Learned to fly in 1936, and served for six years in the R.A.F., mostly instructing. Illness unfortunately makes it unlikely that he will compete.

Townsend, G/C. P. (No. 91, Hart, and No. 99, Hurricane): Flying H.R.H. Princess Margaret's entries—two famous old fighter types, biplane and monoplane. Learned to fly in R.A.F., 1935; was with Nos. 1, 36 and 43 Sqns. and commanded No. 85. Second in King's Cup last year with the Hurricane.

Twitchell, W. J. (No. 72, Proctor): A St. Albans motor trader who learned to fly at Luton in 1949; competed in *Daily Express* Race last year.

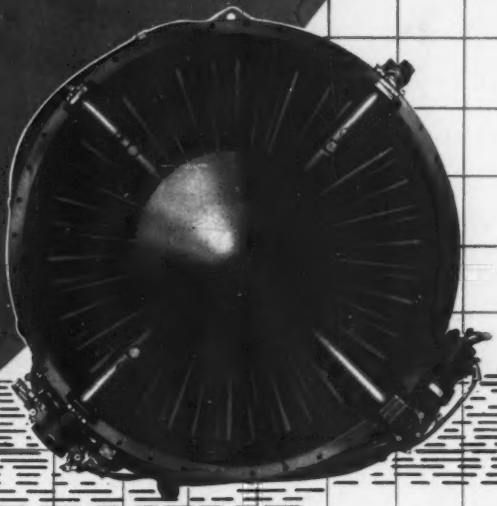
Westbrook, E. W. (No. 28, Messenger): Learned to fly at Brooklands in 1937. Engineer by profession, and engaged in aircraft manufacture during war. Has competed in several races.

Wood, H. (No. 71, Proctor): Learned to fly in 1925, and was chief pilot to Hillman Airways for two years. Is now, at 49, test pilot to Blackburn and General Aircraft, Ltd.

ARMSTRONG SIDDELEY GAS TURBINE DEVELOPMENT

small frontal area is
one result of the annular
combustion chamber

thrust per unit of frontal area = 950 lb per sq ft



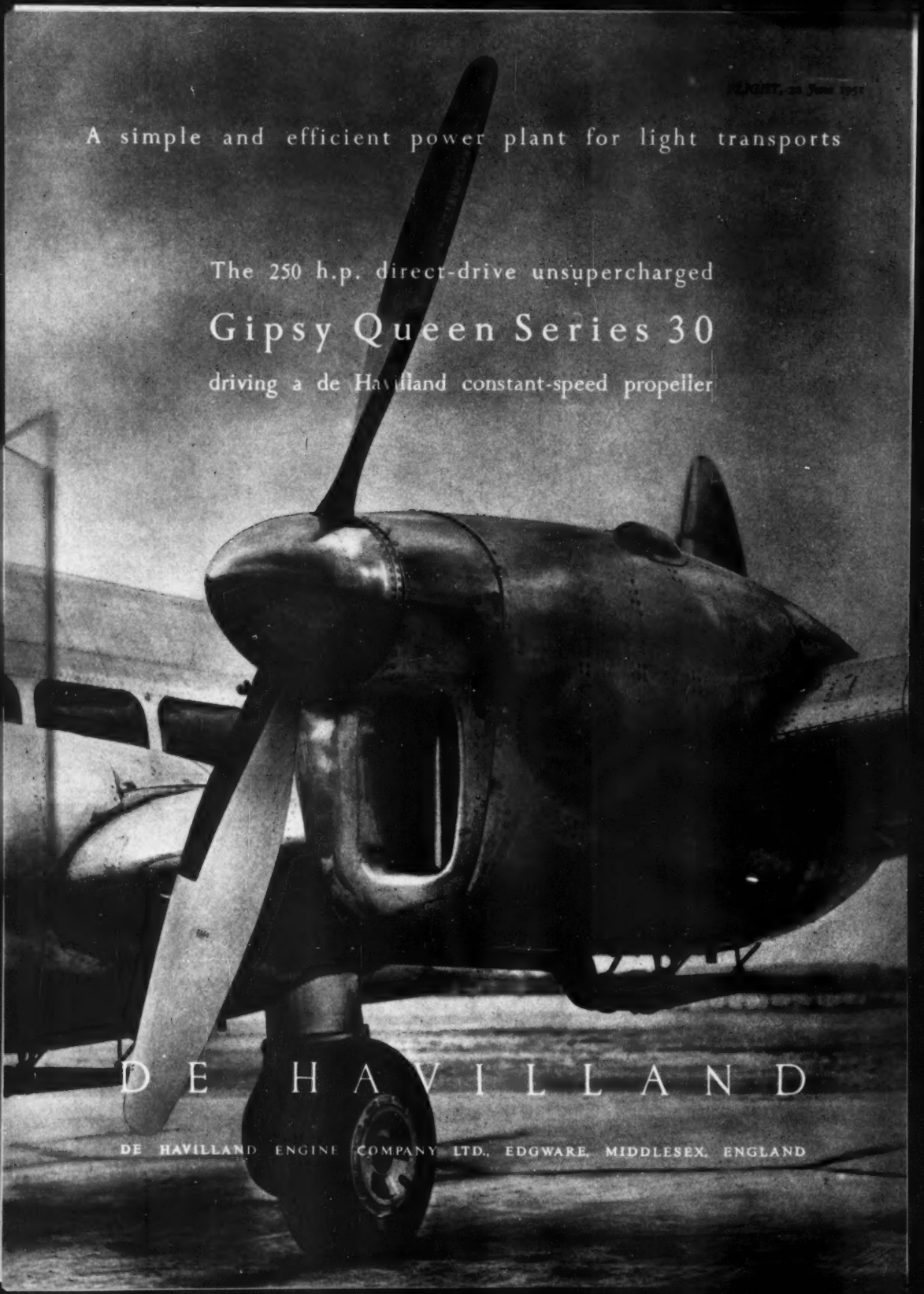
Armstrong Siddeley

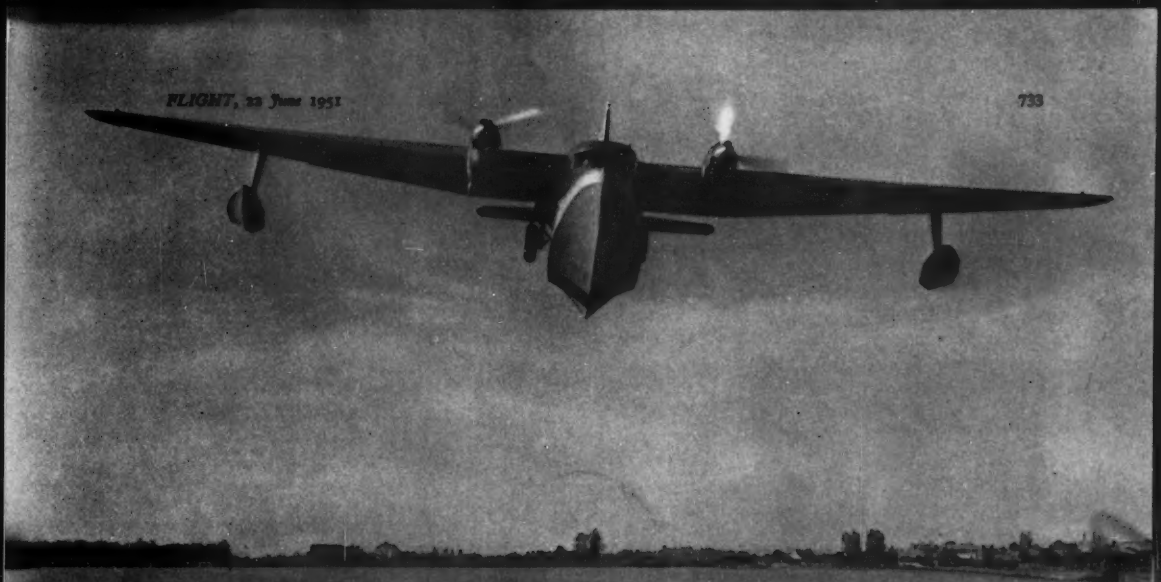
Sapphire

POWER
PERFORMANCE

ALREADY 7,200 lb THRUST

ARMSTRONG SIDDELEY MOTORS LIMITED, COVENTRY • Member of the Hawker Siddeley Group


A simple and efficient power plant for light transports
The 250 h.p. direct-drive unsupercharged
Gipsy Queen Series 30
driving a de Havilland constant-speed propeller
DE HAVILLAND
DE HAVILLAND ENGINE COMPANY LTD., EDGWARE, MIDDLESEX, ENGLAND



SEALAND in the air

Impressions of a Versatile Amphibian . . . . . By E. A. G. RUMBELOW

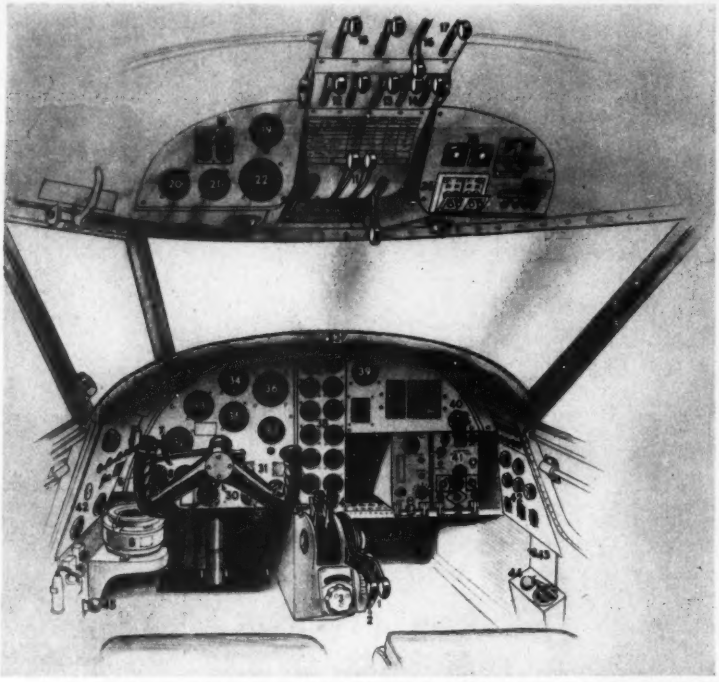
IT would be difficult indeed to find another aircraft, in any category of type, size or price, capable of such an extensive range of useful applications as is the Short Sealand amphibian. That the need for a machine of its kind exists is a fact which has, perhaps, become most apparent in post-war years, when the inhabitants of outlying or inaccessible parts of the earth's surface have found it an increasingly difficult matter to keep pace with the general speeding-up of communications between more progressive regions. In countless territories of differing topography and varying climatic conditions the use of amphibians such as the Sealand can be the means of exerting a powerful influence on the economic and social lives of local communities.

In mentioning a few of its uses—to all of which it is equally well-suited—we must include normal passenger-carrying on feeder services; all categories of survey work; air/sea rescue and ambulance duties; forest and anti-fire patrol; freight charter; police, coastguard and customs patrol; ice-patrol and whaling work; and flying-boat conversion training.

There have, of course, been quite a number of amphibians which have reached the production stage and, in fact, several of them have proved extremely useful in specialized applications, but on most types evolved to date there has usually been some limiting factor which has prevented achievement of any appreciable degree of popularity. Sometimes this has been an economic consideration, but more often than not has concerned the operational limitations of the aircraft itself. The handling of a small flying-boat on water—and water means open sea—is not usually a prospect

FOR some years past, more than one member of "Flight's" editorial staff has been a practising pilot. H. A. Taylor—"Indicator" to his readers—first wrote a series of "In the Air" accounts describing his impressions while at the controls of a variety of British and foreign aircraft. Shortly after the war, Maurice Smith, now Editor, started a second series of "In the Air" handling notes describing new aircraft and comparable in their scope with the road tests of new cars which form a popular feature in our associate journal "The Autocar." To date, no fewer than 42 separate aircraft types, including jets, ultra-lights and four-engined airliners, have been included in this current series. This description of the Sealand, written by another member of the staff, E. A. G. Rumbelow, in effect starts a third series of "In the Air" impressions, which will from time to time augment those written by the Editor.

The Sealand's clean hull form and "happy" frontal aspect show up well in the heading picture, secured as the author took off from Rochester Airfield. (Below) As seen from an accompanying launch—the machine losing speed after touching-down on sheltered water in the River Medway.
"Flight" photographs



1. Throttles
2. Elevator trim
3. Rudder trim
4. Airscrew pitch
5. Feathering buttons
6. Brakes
7. Lift-spoiler control
8. P.11 magnetic compass
9. Flaps
10. Undercarriage
11. Slow-running cut-outs
12. Carburettor cocks
13. Fuel balance cock
14. Fuel-tank cocks
15. Engine air shutters
16. Carburettor air shutters
17. Cabin heating
18. Tailwheel position
19. Clock
20. Flap position
21. Undercarriage position
22. Brakes/bottle pressure
23. Starter buttons
24. Ignition switches
25. Generator switches
26. Fuel gauge, battery, instrument master switch and power-failure warning light
27. Press to transmit
28. Fuel gauges
29. Outside air temperature
30. Vacuum gauge
31. Fire-suppression buttons
32. Height
33. A.S.I.
34. Rate-of-climb
35. Turn-and-slip
36. Artificial horizon
37. Directional gyro
38. Engine instruments
39. Relative-bearing indicator
40. Vacuum change-over cock
41. MF/DF installation
42. Switch and dimmer panels
43. Priming isolation switch
44. Fuel selector and primer
45. Lift-spoiler emergency retract

The Sealand's cockpit offers good vision and a neat and practical layout with every control conveniently near the pilot's hands.

which is contemplated with any marked enthusiasm by the pilot. Similarly, the amphibian's configuration does not normally lend itself to the provision of ideal handling characteristics for take-offs from, or landings on, *terra firma*.

Recently I was able to try out the Sealand with the object of comparing it with previous amphibians I had flown. I did so, I must confess, with an unjust suspicion in my mind that it would prove to have some failing or characteristic which the impressive sales brochures omitted to mention, and which, as I have implied above, would just prevent the type from gaining the proud distinction of being referred to as "a pilot's aircraft."

After two flights from Rochester (Short's demonstration base in this country) I must say that the Sealand more than deserves such a compliment. It is literally viceless, possessed of adequate stability in all planes and, if properly handled, fully as gentle as the proverbial Anson. Before these impressions are analysed in detail, however, it may be worthwhile to include a brief description of the aircraft, in order to understand more readily the actual techniques involved in flying it.

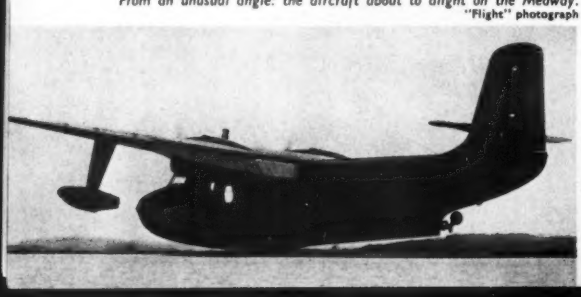
The Sealand is a 5/8-seat high-wing cantilever monoplane with a conventional two-step hull. The two power units are supercharged D.H. Gipsy Queen 70-3s, each delivering 345 b.h.p. at take-off. An exceptional refinement in an aircraft of its size is the use of D.H. Hydromatic three-blade reversible-pitch airscrews, which allow an amazing degree of manœuvrability on the water. They have a pitch range of from +18 degrees fine to +56 degrees coarse, and —11 degrees for the braking position.

At first, Rochester, the airfield from which I flew the Sealand, looked to be a little small for a machine of this type, especially as amphibians usually require a somewhat protracted take-off run. I was assured, however, that there was adequate room, and after a brief consultation with the demonstration pilot, G/C. V. H. A. McBratney, concerning stalling and approach speeds, we stepped aboard G-AKLO. Inside, the two cabins (separated by the undercarriage "boxes") gave a feeling of adequate room, and the large windows should also please passengers. Up to eight seats can be fitted (this, the demonstrator, had five) but if the rear starboard seat is sacrificed a toilet can also be installed. A full cabin air-conditioning system is incorporated, with adjustable outlets at each seat position.

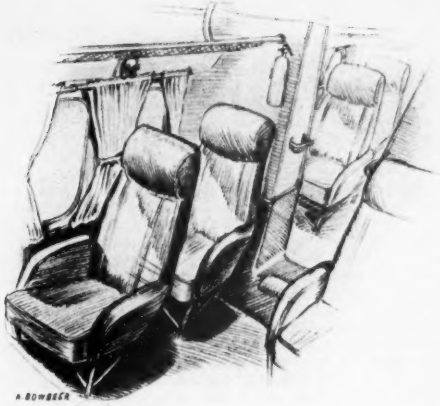
Entering the cockpit for the first time is a pleasant experience, for the arrangement of instruments and controls is so obviously practical that it has the effect of instilling immediate confidence in a new pilot. An excellent field of view is given by the large coupé windows, which have sliding panels on each side. For the pilot, also, there is a safety-glass clear-vision panel on the port side. The standard blind-flying panel is immediately before him, while the throttle and airscrew control levers, together with the rudder and elevator trim-tabs, are mounted on a central quadrant to his right. Engine instruments are located in a central panel in front of the quadrant. The control column itself is fitted with a horn-type hand-wheel, and also embodies a conventional "pull-on" wheel-brake lever. The brakes are pneumatic, and are operated differentially by the fully-adjustable rudder pedals.

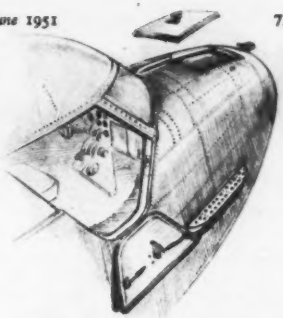
As in most marine aircraft, control cables are run through a central duct in the roof of the hull. The controls can be locked by a single-action lever located behind the pilot, and this arrangement incorporates a safety device by which the throttles cannot be opened when controls are in the locked position. Flaps—a cross between the split and plain type—are pneumatically operated, and the selector is found on the left-hand side of the forward centre roof panel. Here also are the fuel cut-outs and the selector for the *pneumatically* actuated landing-gear. (The pneumatic system is driven by a compressor on the starboard engine, and normally operates through a pressure-reducing valve at 450 lb/sq in. The emergency system is stored at 1,800 lb/sq in in two bottles beneath the cockpit floor.) The roof panels carry (to port) the flap-position indicator, undercarriage lights, triple brake-pressure indicator, and (to starboard) the ignition switches and starter buttons, and fuel gauge, battery and instrument master-switches. In the rearward centre roof panels are the carburettor and main cocks,

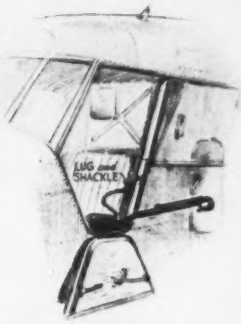
From an unusual angle: the aircraft about to alight on the Medway.
"Flight" photograph



Taxying out to take off from the grass airfield at Rochester.
"Flight" photograph







(Left) The two passenger cabins are spacious and the seats extremely comfortable. (Above) The nose mooring-hatch may be used for securing the aircraft to a buoy; if the pilot is alone, he may make pick-up moorings with the hook stowed inside the hatch beneath the port window.

together with a balance cock for the two 60-gallon fuel tanks (100-octane fuel is used). Moving aft again, we find the engine and carburettor air-shutter levers and the cabin-heating control. The engine priming panel, vacuum selector and most of the remaining electrical switches are located on the starboard side of the cockpit. A leading-edge lift-spoiler can be operated from the control column to help lift the starboard float clear of the water when taking off from glassy sea—of this more anon.

After carrying out the normal control and pneumatic-system checks, I prepared to start the Gipsy Queens. No priming is required in warm conditions, and the carburettor air intake should be opened unless the aircraft is standing on loose-surface ground. With the throttles about an inch open, the engines fired quickly. Warming-up is carried out at 1,200 r.p.m. and normal engine readings are: oil temperature, 60 deg C; oil pressure, 55 lb/sq in; cylinder-head temperature, 250 deg C; fuel pressure, 27 lb/sq in. The run-up to maximum boost (+6 lb/sq in) should give 2,800 r.p.m., and magnetos are checked at 2,700 r.p.m.; drop should not exceed 135 r.p.m.

Airscrews should be exercised throughout their range, and also checked in the braking position. For reverse pitch, the safety-gate pin at the front of the quadrant must be extracted and the control levers moved fully forward with the safety catches raised (for this operation r.p.m. should not exceed 1,200). Positive pitch is regained by moving the levers to the "feather" position, whereupon the revs will drop to 500 and oil pressure will rise as the blades contact the coarse-pitch stops. After a few seconds, the control levers can be moved to the "max. r.p.m." position and the safety-gate pin must then be replaced.

Having tested the controls (including flaps) once more, I signalled "chocks away" and taxied out to the take-off position. I found that taxying required concentration, as the brakes on this particular machine, although effective, were inclined to be a little "snatchy." Prior to lining-up for take-off, I carried out the following cockpit drill: (1) trim tabs neutral; (2) throttle friction-nut adjusted; (3) airscrews to "max. r.p.m.," safety-gate pin in and friction-nut tight; (4) fuel and carburettor cocks on, balance cock off; (5) carburettor intake closed; (6) fuel contents checked; (7) flaps to take-off gate.

The take-off itself I found to be extremely simple. Both engines are opened up simultaneously to 2,800 r.p.m. and +6 lb boost, and if the control column is held in the central position the aircraft will theoretically fly itself off at about 65 kt. In practice, I found it preferable to get the nose down a little in order to counteract a tendency to become prematurely airborne. There was positively no inclination to swing either way. Climbing speed is 85 to 90 kt; the undercarriage may be raised once the safety speed (85 kt) has been reached and the flaps retracted when sufficient height has been gained.

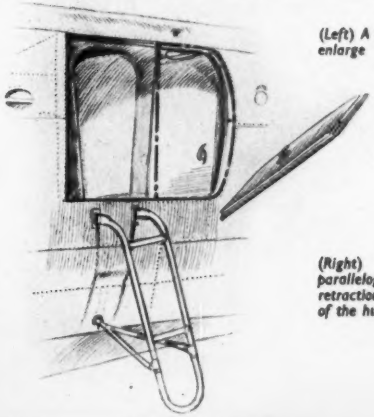
The climb is made at about 2,600 r.p.m. and +3 lb, and the carburettor air intake, if closed, should be opened as soon as is convenient. For normal cruising, 2,350 r.p.m. and +2 lb is used (maximum weak mixture) and will give a reading of about 138 kt I.A.S. There seemed to be negligible change of trim on selecting undercarriage and flaps "up" and, in fact, throughout the whole range of manœuvres the trimmers needed only minor adjustment. Stick forces are small, and the aircraft is perfectly stable in all planes.

By comparison with landplanes of similar size—though such comparison is perhaps unfair—the ailerons, I felt, were a little "spongy"; nevertheless, they were not unpleasant. The elevator is sensitive and a tendency to over-control initially must be checked. I flew for a while in cloud, and found the necessary corrections easy to make with small control movements. At 4,000ft I attempted a clean stall. With the stick held well back there was a slight buffeting at 4 m.p.h. above the stall, which finally occurred at 68 kt. In the clean condition, stall characteristics were a bit ragged. Both wings dropped smartly one after the other, and I found it necessary to recover "one shoulder at a time." Unless the throttles are opened fairly quickly also, a lot of height could be lost. With full flap, however, the stall was gentle and straight, and recovery could be effected merely by a little forward pressure on the control column.

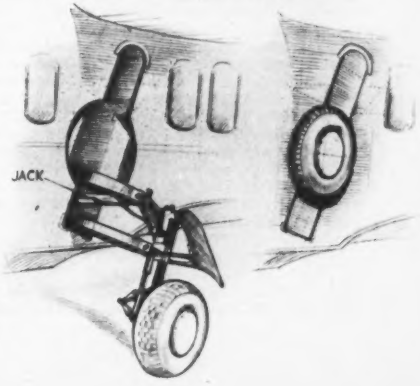
Describing a few languid circles over the Medway, we sought a good spot to alight and, having ascertained the wind direction from the wind-lines on the surface, I prepared to put down. Speed must be reduced to about 90 kt, and undercarriage positively checked by warning lights and visual reference in the "up" position. With take-off flap, the Sealand can be driven around happily at 90 kt while the final landing-path is being selected.

Once an alighting point has been chosen, full flap can be used (with little change of trim) and the aircraft driven down at a gentle rate of descent, maintaining at least 85 kt in the later stages

(*Concluded on page 743*)



(Left) A detachable hatch is fitted to enlarge the normal entrance for freight-loading.



(Right) This drawing shows the parallelogram method of undercarriage retraction and the clean appearance of the hull in the wheels-up position.

CARRIER CO-AXIALS

Details of the Rotol Airscrews for the Double Mamba

WHEN a Naval pilot is about to land his aircraft on a carrier deck, his margin for error is negligible; he is faced with an adventure—every time. Despite the now-common adoption of the "constant altitude" type of approach, however, with its implicit constant-power setting, the necessity for the pilot sometimes to make small adjustments to the power output nevertheless exists, if only as a result of the small tolerance for inaccuracy allowed him. There are, too, the imperative demands for immediate power shut-down when the batsman gives the "cut" signal, and immediate power application when the "wave-off" is given.

These comments may at first sight appear out of place in an article dealing with the design of airscrews; in fact, however, they are important, because the assembly to be examined is, in fact, expressly designed to meet the peculiar demands of Naval aircraft operation. The airscrews concerned are Rotol co-axial units for the Armstrong Siddeley Double Mamba power installation of the Fairey 17 anti-submarine aircraft.

In the case of a piston-engined aircraft, the Naval pilot has no worry as to the response of his engine to the throttle: when he opens or closes it, the reaction on the aircraft is immediate. This characteristic of the piston engine does not, however, apply to the gas turbine. The inherently high rotational inertia of the compressor/turbine assembly provides a strong flywheel effect which makes r.p.m.-change a relatively slow business and this, for Naval aircraft, is a highly undesirable trait. Consider, for example, a turboprop aircraft coming in for a deck landing: everything is just as it should be and then, at exactly the crucial instant, the batsman signals "cut." At once, the pilot closes the power lever, but instead of the aircraft immediately responding and losing speed, it continues to fly on, scarcely checked—a somewhat disconcerting effect. The reason is simply that the energy stored in the compressor/turbine-assembly "flywheel" is converted into thrust by the airscrew and, therefore, closure of the power lever can give only a relatively slow reaction on the aircraft.

To overcome this characteristic, and so permit the turboprop to meet the response requirements of deck-landing aircraft, Armstrong Siddeleys have modified the control system of the Double Mamba (and, incidentally, of the Python for the Wyvern) so that the units now function as constant-speed as opposed to variable-speed engines. The airscrew constant-speed governor unit (c.s.u.) is interconnected with the fuel supply so that, for a constant engine r.p.m., power produced is a function of fuel supplied, and the c.s.u. selects the appropriate blade angle to maintain the r.p.m. and absorb the shaft power produced. By itself, however, this does not cater for the reaction characteristics required during the transition phase of marked power-change. A hydraulic dash-pot device called an engine control unit (e.c.u.) has therefore been incorporated to "trick" the airscrew during the power-transition phase.

When, for example, the power lever is rapidly closed, instead of the airscrew-blade pitch tending to fine-off slowly as a result of the engine's slow deceleration, the e.c.u. feeds oil to the c.s.u. momentarily to raise the governing datum, and so cause the pitch to fine-off rapidly. By contrast, when the power lever is quickly opened, the e.c.u. causes the c.s.u. momentarily to reduce its governing datum, and so induce the pitch to coarsen rapidly to absorb the increased power produced.

In addition to the modified control system, these airscrews are also novel in their employment of a third oil line. (In the conventional Rotol type, oil is supplied through two individual conduits, one each to the front and the rear of the actuating piston to enforce coarsening or fining of blade pitch.) The third oil line has been introduced as an entirely separate entity to actuate an integral lock which permits the blades to be fined-off to a small angle for engine starting. Intrinsically, it is a system which is obviously applicable to reverse-thrust braking airscrews as well.

Each of the airscrews is of essentially similar design in terms of actuation, but the fact that the oil lines and airscrew shaft for the front unit pass co-axially through the core of the rear airscrew necessarily means that the detail design differs appreciably. In that the front airscrew is, however, somewhat more simple to describe, it may be examined first; the understanding thus gained will be of use in a study of the rear complement.

The front hub is a single-piece, four-barrel, forged-steel shell, radially flange-bolted at the front, and axially through-bolted at the rear to the hub driving-centre. The latter, conventionally, is splined to the No. 4 size airscrew-shaft and is drawn-up on cone seatings by a ring-nut on the shaft nose. Special Timken twin taper-roller bearings are used to retain the forged duralumin blades, the central race of the bearing being buttress-threaded in the hub barrel. The upper and lower races seat against steel shrunk-on inserts on the blade shank, and the lower race is dogged direct to the heel of the blade root. Centrifugal loads are taken through the blade bolt—a spool threaded into the root and with a flanged base which bears against the lower race of the blade bearing. In the blade-root cavity above the bolt are housed lead-washer balance weights.

Into the mouth of the hub driving-centre is threaded a multi-diameter stepped sleeve which pierces and retains the back-plate of the pitch-change cylinder, the root flange of which is through-bolted to the back-plate rim. The pitch-change piston is bushed with a hardened-steel bearing surface which rides on the forward trunk portion of the

Assembled to the Fairey 17 anti-submarine aircraft, the 11ft-diameter airscrews seem a good deal smaller than, in fact, they actually are.

stepped-sleeve piercing the back-plate. On the forward face of the piston are bolted a pair of L-section rings, the free flanges of which serve as the superfine (starting) pitch and the flight-safety-pitch stops. The latter is effectively the normal fine-pitch stop, and it is for the removal of this stop (to permit the piston to move forward until the superfine stop is engaged) that the third oil line in the airscrew is embodied. The free flange of the flight-safety stop-rings butts against the rim shoulder of a collet in the forward mouth of the multi-stepped sleeve.

Immediately forward of the collet is the front end-wall or crown of the pitch-change cylinder; this crown is of junk-head form, and is secured in the cylinder by a buttress-threaded retaining ring-nut. The junk-head itself serves as a cylinder for the lock piston, this secondary piston being enclosed by a circlip-retained cap through which are drillings venting to atmosphere the volume forward of the piston. Somewhat resembling a poppet valve, the lock piston has a cylindrical stem, around which is fitted a cup enclosing a coil spring that reacts against the rear face of the lock cylinder. The spring cup is retained on the piston stem with a sleeve nut, and at its forward end the cup is threaded to a buttress-section ring which supports the collet segments from collapsing under engagement with the flight-safety stop-ring. Third oil-line delivery to the rear of the lock piston induces forward motion of the piston, so compressing the coil spring, removing the support from the collet mouth, and thus allowing the main pitch-change piston to travel fully forward. The lock piston is returned (and the collet again supported) under the action of the coil spring immediately the delivery of pressure oil to the lock cylinder is cut off.

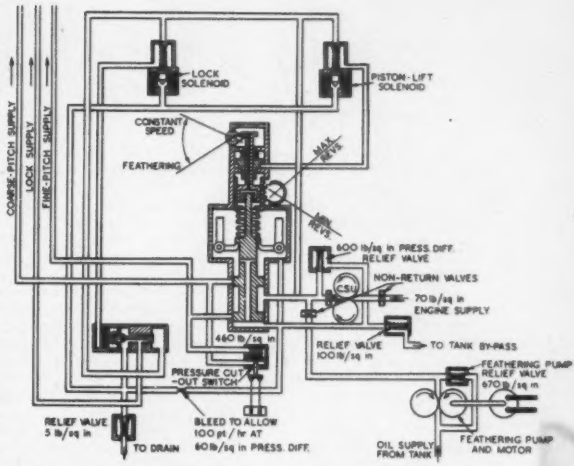
The blade-operating eyebolts are attached direct to the pitch-change piston, and slide in guide sleeves housed in bushes flange-bolted to the hub barrels. The eyebolts terminate in fork-ends, in which are floating-pinned the shanks of operating links; the "big ends" of the links are Tufnol-bushed for engagement with the operating pins. These latter are virtually crank-pins, and each is dowelled and bolted to the lower race of the blade bearing.

Front-airscrew Oil Supply

Fitted around the sleeve nut which retains the coil spring cup is a bell sleeve to the flange of which is through-bolted the nested flanges of the three co-axial oil tubes that serve the front airscrew. The core line of the three carries coarse-pitch oil, the centre annulus carries fine-pitch oil, whilst the outer annulus accommodates oil for lock actuation. The (solid) nose of the innermost oil tube is threaded to the boss of the lock-cylinder crown, and is locked to it with a circlip-retained externally- and internally-splined sleeve. The periphery of the lock cylinder crown cap is splined to the junk-head crown of the pitch-change cylinder which, in turn, is locked to the buttress-threaded ring-nut by means of a dogged locking ring. The outermost oil tube carries a flange towards its rear end which is splined to the forward mouth of the hub-retaining nut. Thus the oil tube assembly acts as a lock transfer medium between the right-hand thread of the hub-retaining nut and the left-hand thread of the main cylinder crown retaining ring-nut.

As already mentioned, in essentials the rear airscrew (a right-hand tractor unit) is similar to its forward left-hand tractor complement but, of course, the fact that the front airscrew shaft, together with the oil-feed assembly, has to pass through the core of the rear airscrew cylinder makes it necessary for the whole cylinder/piston assembly of the rear airscrew to be annular in character. This is made the more complicated by virtue of the fact that the diameter of the rear cylinder has had to be kept as small as is practicably possible, not only for weight reasons, but also because the delivery characteristics of the oil feed to the rear airscrew must match fairly closely those for the front airscrew, if only for reasons of standardization between pumps and control units.

The rear hub driving-centre is drawn up on the usual cone seats by the hub-retaining ring-nut threaded on the nose of the (outer) No. 6 size shaft and, as in the forward airscrew, is radially flange-bolted at the front and axially flange-bolted at the rear direct to the hub shell. The



This schematic diagram illustrates the operation of the control units governing the supply of actuating oil to each airscrew.

assembly of the blades in the barrels is precisely similar to that employed in the front airscrew but, owing to the larger spinner diameter at the rear, the transitional length of the blade shanks from a circular section at the hub barrels to the aerofoil section of the blade proper is considerably greater.

Axially bolted on the front of the hub is an annular plate, to the rim of which the root flange of the cylinder, and the rear end-wall of the cylinder, are jointly through-bolted. To the front of the cylinder is axially bolted the crown, or forward end-wall, which, like its front complement, is of semi-junk-head form. In the root bore of the crown is threaded the oil-transfer sleeve, locked through a dogged ring and, at the rear, splined in the mouth of the hub-retaining ring-nut. As in the front airscrew, locking-back between hub-nut and cylinder is thus obtained.

In the stepped bore of the cylinder crown is a multi-step-section steel sleeve which serves as a housing for the roller bearing supporting the inner (front airscrew) shaft. The tail of the inner shaft, and the outer shaft as a whole, are supported in the engine reduction-gear casing, and front-support loads for the inner shaft are transferred through the roller bearing and thus taken back into the outer shaft through the cylinder/hub assembly of the rear airscrew. Oil retention on the forward side of the roller bearing is effected by means of the latest type of Angus lipped-seal. This is a synthetic rubber unit of figure "2" section, bonded to an L-section metal reinforcing ring, and the inner lip of the seal is spring-retained in contact with a hardened and ground steel sleeve trapped between the rear cone of the front airscrew and the inner race of the roller bearing. Whilst on the subject of sealing, it may be mentioned that, with the exception of U-seals used on the piston, eyebolts and at one or two other locations, oil-retention is effected by the use of O-rings.

The piston is an annular member, to the front face of which the flight-safety and superfine-pitch stops are bolted. The piston slides on a steel sleeve, the rear bore of which is threaded to the boss of the cylinder rear end-wall. In the bore of the piston is accommodated the lock collet, the forward mouth of which normally engages a support ring threaded on the forward end of the lock cylinder. There is considerable divergence here from the lock design of the front airscrew. The lock cylinder is a moving unit, surrounding a stationary (reaction-member) piston, which is trapped between the main cylinder crown and a shoulder on the outside diameter of the oil-transfer sleeve.

The rear mouth of the lock cylinder is closed with an end-wall block in which are axial drillings accommodating the several coil springs for returning the lock. The springs are enclosed by retaining cups that react against the root

CARRIER CO-AXIALS . . .

flange of the collet which, in turn, bears against the forward rim face of a flange on the oil transfer sleeve.

The eyebolt/operating-pin assembly for the rear airscrew is similar to that used in the front airscrew, the eyebolts being connected direct to the pitch-change piston.

Although seemingly far more complicated than the method used for the front airscrew, the transfer of oil to the rear airscrew for pitch-change and lock actuation is, in fact, not difficult to understand. In the annular cavity between the outside diameter of the inner airscrew shaft and the bore of the outer airscrew shaft is accommodated a cavity-wall sleeve. The annular cavity in this sleeve is axially divided into three separate volumes, each of which accommodates oil for one of the three actuation functions of the airscrew. From each individual oil cavity, tappings give into land-divided volumes in the oil transfer sleeve, whence the oil is conducted *via* drillings to the appropriate places—that is to say, to the front of the main piston for effecting a coarsening of blade pitch, to the rear of the piston for fine pitch, and to the rear of the lock piston for actuating the flight-safety stop lock. These dispositions of oil apply similarly to the front airscrew assembly.

In the opening paragraphs of this article, the high rotational inertia characteristics of the gas turbine were touched upon, and by the same token that this inertia introduces control problems in the transitional phase of power change, so does it also introduce problems in engine starting. What it amounts to is that the compressor/turbine assembly has to be spun up to a rotational speed sufficiently high for the compressor delivery to be enough to permit combustion. This takes a little time, and the demand made upon the starter is not small. In turbo-prop power units where the airscrew is directly coupled (through a reduction gear) to the compressor, it is obvious that the starter has to turn the airscrew as well as the compressor/turbine assembly and, even with the airscrew blades at their normal fine pitch setting of about 20 deg, the additional load imposed on the starter as a result of the airscrew blades thrashing the air is very considerable.

Third Oil Line

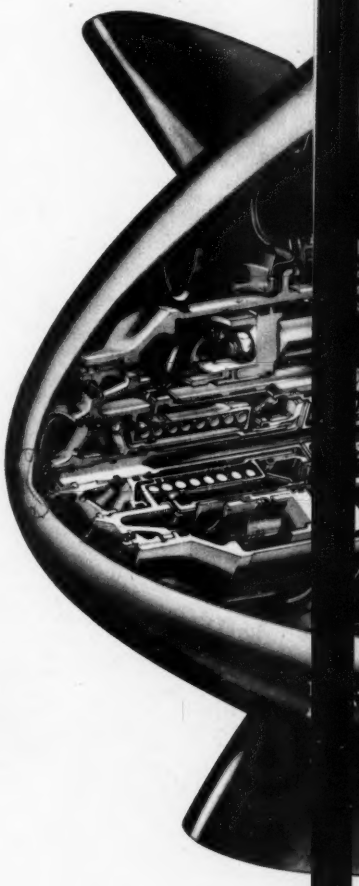
To reduce to a minimum the airscrew load in engine starting, it has for some time been the practice to fine-off blade pitch to a low angle, and this has been effected by the incorporation of a withdrawable fine-pitch stop in the airscrew cylinder/piston assembly. In the past, this over-riding of the normal fine-pitch stop was obtained as a result of a temporary increase in fine-pitch oil pressure, but there were drawbacks to this system which made it desirable that the stop-lock should be actuated as an entity quite separate from the normal pitch-change actuation of the airscrew. Thus the third oil line was introduced.

During his landing approach, the pilot presses a switch to energize the lock circuit and, the lock having been collapsed, the blades are able to fine-off to (and constant-speed at) an angle below that of the flight-safety stop in order to match the high-revs/low-power condition of the constant-speed engine. It should be noted here that "flight-safety stop" is merely a new term for what used to be called the "fine-pitch stop." The new name has something to commend it, however, in that although the stop acts as the normal fine-pitch setting of the blades, this setting is also the angle to which the blades will revert and at which flight can safely be sustained in the event of engine/airscrew control failure.

When it is required to shut down the engine, the h.p. fuel-cock lever is pulled back beyond the normal closed position to the feathering position. The flywheel effect of the engine once more becomes manifest here, for it takes an appreciable time for the engine to run down to a stop, and this characteristic is put to use for, whilst the engine is running down, the c.s.u. is delivering oil. Movement of the h.p.f.c. lever back to the feathering position lifts a valve in the top of the c.s.u. which causes the residual oil delivery to be passed into the "coarse-pitch" line to feather the blades. By this means, not only does the high drag of the blades thrashing the air cause the engine to come to rest fairly quickly but, the blades being feathered, there is little tendency for the airscrew to "windmill" the engine in the comparatively high wind speeds which usually prevail over an aircraft carrier's deck.

When the engine is once more to be started, the h.p.f.c. lever is moved forward out of the feathering position so dropping the valve in the c.s.u. to cut off delivery to the coarse-pitch line. The electrically-driven feathering pump is then energized and delivers oil to the c.s.u. whence it is directed to the fine-pitch line to unfeather the blades. A micro-switch on the oleo leg of the aircraft undercarriage acts as a safety unit in the lock circuit in flight, but when the aircraft is on the ground a solenoid is automatically energized to actuate a servo valve which admits high-pressure oil from the feathering pump to the lock cylinder. This withdraws the support ring of the lock collet, so that the main pitch-change piston can move fully forward

This impressive drawing of the co-axial airscrews for use with Double Mamba power installations shows the internal mechanism of this complex assembly in unusual and intricate detail.



F. ALLEN

CARRIER CO-AXIALS . . .

and so rotate the blades to the superfine (starting) pitch angle. The present practice with the Double Mamba power installation of the Fairey 17 is to start the front airscrew/engine first and then use the slipstream to windmill the rear airscrew up to starting r.p.m.

In conclusion, mention must be made of the automatic-control function which takes place in the event of engine failure. Immediately failure occurs, reverse torque is registered, and this closes a switch which energizes a second solenoid in the control system. Actuation of this solenoid moves a valve to open the c.s.u. pump delivery to the underside of a small piston unit in the c.s.u., movement of this piston causing the c.s.u. valve assembly to lift and so direct pump delivery to the "coarse-pitch" oil line. When the torque switch closes, current is simultaneously supplied to the feathering pump, the oil delivery from which is passed straight through the c.s.u. (owing to the raised piston valve) to the coarse-pitch line, to move the pitch-change piston rearward until the blades are fully feathered. C. B. B-W.

SOME RECENT BOOKS

"That Great Hunter," by Daphne Slee. Peter Davies Ltd., 99 Great Russell Street, London, W.C.1. Price 9s. 6d.

IT is seldom that a first novel justifies review in a technical journal: *That Great Hunter*, which has been selected as a *Daily Graphic* "Book Find of the Month," is one of the exceptions. Its author was resident teacher of the English language at a Polish camp in Buckinghamshire, which helps to explain her choice of a Polish officer as the dominant character in her plot. Her spare-time interest as a W.R. Aux.A.F. member of a Fighter Control Unit explains in part Miss Slee's intimate knowledge of the Royal Air Force, which forms the background to this superbly-drawn character study of life at a wartime Bomber Command station in England.

In brief, *That Great Hunter* tells of the experiences, both gay and grim, of Jan Matyjasik, the Polish commander of a British bomber squadron at an airfield whose occupants have an anti-Pole complex. It contains just the right balance of drama, comedy and technical narrative, spiced with a little romance, to cater for all tastes—and does so without ever getting morbid, outrageous or stodgy. Miss Slee shows an incredible understanding of the psychological effects of wartime bomber operations on the crews who made them, and her characters (unlike those in many novels) are rarely larger than life.

"Stalin Means War," by Col. G. A. Tokaev. George Weidenfeld and Nicolson Ltd., 7, Cork Street, London, W.1. Price 12s. 6d.

WHETHER or not one approves in general of books written by political refugees, purporting to give a true, unbiased picture of life inside their late homeland, one cannot afford to ignore these memoirs of the late Chief of the Aerodynamics Laboratory of the Moscow Military Air Academy.

Col. Tokaev's book does not make pleasant reading. His description of life on the other side of the Iron Curtain is horrifying to anyone who cherishes even the slightest vestige of personal freedom, and his warning that the Politbureau is directing immense efforts towards all-out preparation for World War III, with a 1952 deadline, is most depressing.

We are not, however, concerned here with Col. Tokaev's political views or predictions so much as with his description of Russian aeronautical research since the end of the war. The overall impression one gains is that Soviet technicians divide their time between trying to kidnap German scientists and endeavouring to perfect aircraft well beyond the present technical capabilities of themselves, or anyone else. On the other hand, recent Russian achievements in mass-producing the Mig-15 and other jet types would seem to indicate that not all their efforts are so fruitless or uninspired as Tokaev implies.

He has much to say about Stalin's personal interest in the Sanger-Bredt project for a giant antipodal rocket-bomber, able to fly from Western Russia to America and back in one hop. The Marshal is supposed to have ordered concentrated development work on these bombers at the expense of all else, as "their possession would make it easier to talk to the gentleman shopkeeper Harry Truman, and keep him pinned down where we want him."

Tokaev also refers to Russian production of the V.1 and V.2 in the period before he escaped to the West in 1947. Chief criticism of the book is that he uses far too much ink trying to extol and justify his anti-Stalinist activities inside Russia and his reasons for getting out.

"Fifty Years Fly Past," by Geoffrey Dorman. Forbes Robertson Ltd., 17, Fleet Street, London, E.C.4. Illustrated. Price 15s.

FOLLOWING hard on the heels of his *British Test Pilots*, Geoffrey Dorman has chosen the first half-century of powered flight as the subject of his second book. Once again there is an introduction by Lord Brabazon, followed this time by an introduction to Geoffrey Dorman by Tommy Rose.

Fifty Years Fly Past is interesting and full of useful facts, figures and anecdotes. But it is not strictly a history of British aviation so much as a collection of short biographies of some of the organizations, people and companies which have contributed to the overall story. For example, there is a complete 11-page chapter on the de Havilland Enterprise, while other major firms receive little more than a single paragraph in a general chapter entitled "The Rise of the British Aircraft Industry." This makes the whole thing more readable for the layman and young enthusiast, but lessens its value to those who seek a comprehensive, completely reliable reference volume.

Despite its deficiencies, this book is a good fifteen shillings' worth, for Mr. Dorman has devoted several of his 43 chapters to subjects that are normally overlooked in a popular work of this type. Examples chosen at random are "The Fédération Aéronautique Internationale," "The Light Aeroplane Movement," "Women in Aeronautics" and "First Aerobatics and Parachutes," while the very complete lists of results for such events as the Schneider Trophy, Aerial Derby, Gordon Bennett Aviation Cup and King's Cup races, plus the progress of world distance, height and speed records are a further valuable feature of the book.

J. W. R. T.

AN IMPROVED ACCELEROMETER

RECENT research in the Engineering Mechanics Section of the U.S. National Bureau of Standards has resulted in an improvement of the Ramberg vacuum-tube accelerometer. The new pick-up provides rather more sensitive and reliable acceleration measurements than did the earlier version which, despite slight erratic changes during its operation, had been successfully applied both to field and laboratory acceleration measurements. These accelerometers have been used for measurements on pilot-ejection devices for high-speed aircraft, in landing-impact tests for model aircraft, as well as on aircraft in actual flight.

The primary design requirement met by the Ramberg vacuum-tube accelerometer is its provision of an electrical signal of sufficient strength to drive directly a high-frequency recording galvanometer, whilst at the same time having a relatively high natural vibration-frequency. In the original model, erratic changes or "zero shifts" in balance point were sometimes encountered, but it is stated that this difficulty has been eliminated in the new version. The pick-up is a twin-diode vacuum tube consisting of a fixed, indirectly heated cathode, and two plates, one on each side of the cathode. The plates are elastically mounted so that they are deflected if the base of the tube is accelerated in a direction perpendicular to the plane of the plates. In evaluating the performance characteristics of the accelerometer, it was established that the natural frequencies of the plates of seven individual pick-up units were within one cyc/sec of the average value of 161 cyc/sec.

"Zero shift," resulting from excessive accelerations to the pick-up during handling and installation, is prevented by stops which limit the plate excursion and thus prevent overloading. "Zero drift," believed to be due to small frequencies in the cathode electronic emission, has been effectively reduced by (a) giving the pick-up an ageing treatment, (b) using two "getters" instead of one, and (c) increasing sensitivity by a factor of 25. The largest "zero drift" over a four-hour test period for the seven tubes was 0.040g, whilst the smallest was 0.006g. The maximum g for each tube, i.e., that which caused the plates to contact the stops or the cathode, was found to be between 9.3 and 13.3g.

The accelerometer in its present form provides a useful addition to available measuring equipment for accelerations up to about 5g at frequencies up to about 20 cyc/sec. It is, however, intended to develop designs of the accelerometer to cover other ranges and also to develop models having high plate-resistance to give the high-voltage output required for many electronic applications.

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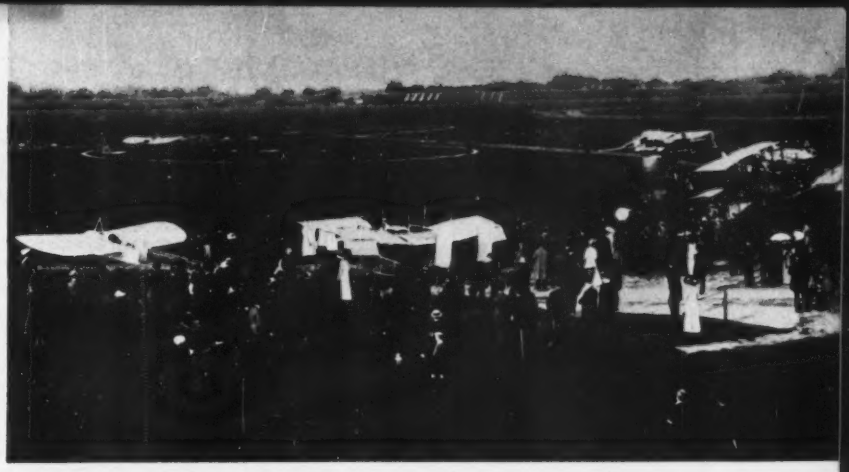
Chipmunk
Standard trainer of
the R.A.F.V.R. and in
service in seventeen
countries
now adopted by the Royal Air Force



Some of the aircraft which took part. In the centre is Horatio Barber's unconventional Valkyrie, a "tail-first" pusher; to the right is Cody's famous "Cathedral."

By . . .
HARRY HARPER

Britain's First Military Air Display

How a Few Enthusiasts "Woke Up England" Forty Years Ago

THE other evening, while in reminiscent mood, some of us were recalling that wonderful series of R.A.F. displays staged at the history-making Hendon Aerodrome between the wars.

During these nostalgic indulgencies somebody ventured the opinion that the first of these air displays (or pageants, as they were then called), held at Hendon in the summer of 1920, was actually the first affair of its kind ever organized in this country.

But this was where I, as a now-acknowledged Rip Van Winkle of aviation, surprised more than one of those present by reminding them that not only was that opening pageant of 1920 definitely not the first of its kind to be held in this country, but that the first of all such military air displays had been held at this same Hendon Aerodrome as many as nine years earlier than that—as far back, in fact, as the spring of 1911.

Some of the events of early air history, even some big and significant ones, are apt for one reason or another to fade so much into the past that they become more or less forgotten. Which seems very much the case with that pioneer demonstration of the then-just-dawning possibilities of the aeroplane for military purposes, held on a fine May afternoon all those forty years ago. Yet when one remembers what a novel event this was at the time, and what keen interest it aroused, not only among the public but also in official quarters, it certainly deserves to loom large in the records of early days.

Certainly I myself feel glad that I was privileged to be one of those present at Hendon on that memorable afternoon of May 12th, 1911. Of course, in those now far-off days military aviation was a more or less vague kind of proposition, looked upon with lukewarm interest by many, and advocated vigorously by only a few individuals, who were generally regarded as having bees in their bonnets.

Yet even at that quite early stage there was a small group of Members of Parliament who were already alive to the dawning potentialities of air power, more especially as it would affect the future of our military and naval plans in this country. It was these far-seeing M.P.s who had formed themselves into a Parliamentary Air Defence Committee, and it was one of the results of the energetic work of this committee that the Clement-Bayard airship flew over from Paris, to be housed in a big shed on Wormwood Scrubs, and afterwards acquired by the Government. Apart from the attention being given to lighter-than-air craft, which were then regarded as ideal machines for long-range reconnaissance, there was a strong and growing demand from the members of this committee that far more official encouragement should be given to the building of military aeroplanes in England, and to the establishment of an aircraft industry capable of rapid expansion in time of war.

It was to focus public as well as official attention on the growing significance of the aeroplane as a war machine that it was decided to organize a special pioneer display. And it was here that the committee secured the enthusiastic co-operation of Mr. Claude Grahame-White, who had already begun to operate Hendon as a popular flying centre under the name of the London Aerodrome—and who had been doing quite a lot, also, by his own flying and in other ways, to impress upon the general public that it would be vital for us in the years ahead to play a really energetic part in the development of the air arm.

It had been in pursuance of his "Wake Up England" campaign that he had gone down to the House of Commons, a few days prior to this Hendon display, and had spoken vigorously before members of the Aerial Defence Committee, declaring that the possession of adequate air power was vital to the whole future security of Britain.

Luckily the weather was kind to us out at Hendon on that afternoon forty years ago, and in addition to a big crowd of ordinary spectators, the influence of the Parliamentary Aerial Defence Committee had brought together a really impressive attendance of well-known people of the day.

As Air Reporter No. 1, gathering material for my next day's news feature in the *Daily Mail*, I was busy hurrying here and there in the reserved enclosure and out on the aerodrome. Among the V.I.P.s I remember recording as being in the reserved enclosure were the Duke and Duchess of Connaught, Prince Arthur of Connaught, Lord Fisher, Lord Roberts, Lord Lansdowne, Lord Haldane, Lord Northcliffe, Lord Charles Beresford, Sir Ernest Shackleton, Mr. Asquith, Mr. Lloyd George, Mr. Balfour, Mr. Herbert Samuel, Col. Seely and Mr. McKenna (then First Lord of the Admiralty). In addition there were nearly 200 M.P.s present, not forgetting scores of naval and military officers of all ranks.

It was one of the big moments of the afternoon when Grahame-White succeeded in persuading Mr. Balfour to discard his soft felt hat and climb up behind him in his Farman biplane. They made two circuits, Mr. Balfour's grey locks blowing back in the wind as he glanced from side to side. Even what was such a novel experience, at that time at any rate, did not in any way affect the genial imperturbability of Mr. Balfour. Afterwards, though somewhat breath-

The central figure in this photograph taken at the Military Air Display is not, as might be thought, a certain famous film artist, but Mr. David Lloyd George, attired in typical men's clothing of the 1911 era.

Britain's First Military Air Display . . .

less from sitting exposed in a machine with nothing in the shape of an enclosed cockpit, he smiled benignly on me when I approached him for his personal impressions of flying. Not that I got anything that my news editor thought much of afterwards; Mr. Balfour would not be drawn, just waving me aside in his pleasantly aloof way with some quite conventional remark about its having been "a quite exhilarating experience."

Another highlight of that memorable afternoon was when the inimitable Cody suddenly loomed in the air above us, having flown over from his shed on Laffan's Plain, near Farnborough, piloting that big biplane of his known affectionately as "The Cathedral." This great showman put up one of his usual picturesque performances. I can remember him leaning forward at the controls as he circled the flying ground; his attitude always suggested that he was "riding" rather than flying that formidable biplane, urging it on through the air in the same way as I had seen him galloping a horse across Laffan's Plain, wearing a big broad-brimmed hat in true cowboy style.

Apart from several Farman biplanes, there were, I recollect, a number of Bleriot monoplanes taking part in the afternoon's flying, not forgetting that quite unusual type of experimental "Valkyrie" monoplane designed, built and flown by Mr. Horatio Barber.

In the flying programme were events arranged to demonstrate the value of the aeroplane for reconnaissance purposes, and also as a carrier of urgent military despatches. It was Gustav Hamel in his Bleriot who, in the despatch-carrying test, flew with a message from Hendon to Aldershot and returned to Hendon with a reply, completing the out-and-return flight in an hour and three-quarters, easily beating the time taken by duplicate messages sent by telegraph.

In the aerial reconnaissance test, two machines carrying Army officers, Major Evelyn Wood and Capt. Sykes, flew out and located a battalion of infantry with two squadrons of cavalry and a battery of artillery which had been sent out by the War Office to lurk in the neighbourhood of St. Albans. The two pilots were Compton Paterson and M. Charles Hubert. Other pilots who gave demonstrations during the afternoon included Howard Pixton, Armstrong Drexel, Clement Greswell and the actor-airman, Robert Loraine.

A really outstanding event in the programme was provided by Grahame-White, when he went up in his Farman, carrying 100-lb bags of flour to represent bombs. Out on the centre of the aerodrome, in white lines, had been marked the outline of a battleship. And it was to show how such a vessel could be attacked from the air that Grahame-White now did what was a truly remarkable piece of flying, at any rate from the viewpoint of what we were accustomed to seeing forty years ago.

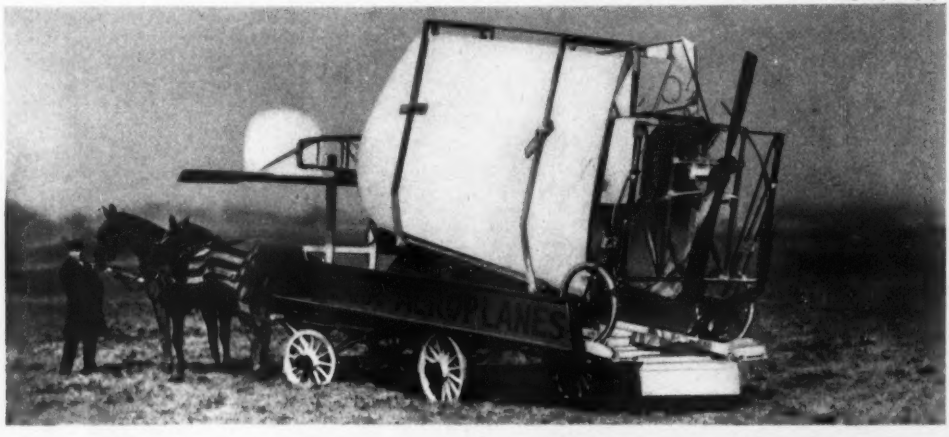
First he steered away from the aerodrome, climbing as he did so. Then back he came, diving steeply and passing right over the dummy battleship. As he did so he released a bag of flour, which burst quite realistically right in the middle of the vessel. Then round he went again, and this time, when he came in for another attack, one of his "bombs" went right down a "funnel" of the battleship—a hit which I remember being rewarded with loud cheers.

It was after this that Grahame-White, in high spirits at the obvious success of the proceedings, went on to gambol about in the air in a way which evoked gasps of astonishment from many of the spectators. He made that Farman of his climb faster, and dive more steeply, than I had ever seen any machine of the type do before, while some of his almost vertical turns made even other pilots raise their eyebrows.

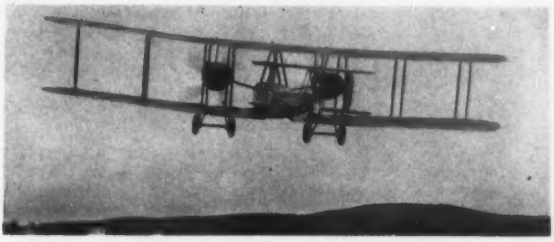
Then, as a fitting climax, he came diving down right over the enclosure in which the V.I.P.s were assembled. Of course he knew to an inch what he could do with the Farman, and the weather was perfect for any pioneer display of aerobatics; but, even so, I remember seeing Mr. Lloyd George ducking down, involuntarily, as the biplane went roaring over, seemingly only a few feet above his head.

Very probably—and to turn to the modern idiom—this was the first recorded beat-up!

An "erecting and dismantling test" was one of the items in the programme; a Bleriot monoplane arrived on the field in this fashion to take part in it.
"Flight" photograph



History repeats itself



Thirty two years ago — on June 14/15th, 1919 — the Rolls-Royce "Eagle" powered Vickers Vimy made the first direct crossing of the Atlantic by air, in 16 hours 12 minutes.

This year—on February 21st—the Rolls-Royce "Avon" powered English Electric Canberra was the first jet aircraft to fly the Atlantic direct without refuelling, in 4 hours 37 minutes.

ROLLS-ROYCE
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The P.56 "PROVOST"

SIDE-BY-SIDE TWO-SEAT BASIC TRAINER

(Leonides Engine)

SELECTED FOR THE ROYAL AIR FORCE

". . . it remains only to be
said that the Boscombe Down report on
the aircraft was such as to be fairly described as
eulogistic, the rate of roll (about 90 deg/sec) and
the aileron response, in particular, being extraordinarily good.
In the P.56, therefore, it would seem that the
Royal Air Force can look forward
to having a basic trainer which, for its designed sphere,
is without doubt at the moment unrivalled." *"Flight" May 4th*, 1951.

PERCIVAL AIRCRAFT LTD., LUTON, BEDFORDSHIRE, ENGLAND and at TORONTO, CANADA.

A Hunting Group Company

SEALAND in the air . . .

(*Continued from page* 735)

of the approach. A slight check is given at about 10ft to bring the nose up a little and, as the throttles are closed, the machine will touch lightly on its step at about 75 kt. The stick should be moved slowly back as the speed falls, and coarse aileron used up to the last minute to keep the floats out of the water. There is no tendency to pitch or yaw, and the Sealand decelerates rapidly. Flaps can be retracted once the speed has fallen away altogether, and, if required, the undercarriage may be dropped to give better directional control for taxying.

Taxying, it should be mentioned, is a sheer delight with the reversible airscrews. With one in reverse, the Sealand practically turns in its own length, while with both in that condition it will amble astern at quite an appreciable speed. In pitch-reversing, however, care must be taken to leave a little time in hand, as several seconds will elapse before the push or pull become effective in the required direction.

Mooring is very simple and may be carried out by the pilot alone, the hook stowed at his left side being used through the side hatch below his port window to pick up the moorings.

As with all marine aircraft, the water take-off is rather more tricky than the alighting. In the Sealand, the very reverse of accepted flying-boat technique has to be used, the control column being pushed right forward in the initial stages to prevent the nose from rising sharply and the starboard float from submerging. Take-off flap should be selected and the throttles opened up gently. There is no appreciable inclination to swing, and the bow-wave moves aft rapidly and leaves the pilot quite able to see where he is going (on some boats I have known, it blinds him for the first ten seconds or so). Coarse aileron and strong rudder movements may be necessary to keep the floats out of the water and the nose lined up on a pre-selected point on the horizon during the early take-off.

While the machine is moving up to the "hump" speed (the speed at which transition takes place from "buoyancy" to the planing position) some fairly strong elevator action may also be required to keep the nose down. Any tendency to porpoise once the "hump" speed is reached may be damped out by back pressure on the control column.

Elevator control during take-off is, on the whole, a rather tricky technique which it is as well to master completely before considering oneself a qualified Sealand pilot. While there are no inherent vices, in certain water and wind conditions it would be easy to get into trouble. When one is flying off glassy water, the lift spoiler is used up to 35 m.p.h. to keep the starboard float clear at high angles of attack. Once up on the front step, the aircraft accelerates quickly and flies itself gently off the water at around 70 kt. The maximum sea condition which the manufacturers recommend as allowable for the Sealand is 1½ft.

After several alightings and take-offs—for which the water conditions were excellent and my efforts, therefore, free from those jarring, passenger-worrying slaps which a hull has to endure in a choppy sea—I returned to Rochester for a landing on the grass. On reaching the airfield I must confess that I once again had the feeling that more length was needed, but soon found that I had nothing to worry about. Having already checked the rate of descent as being about 1,100 ft/min with power off, flaps down and undercarriage up, I did not contemplate much possibility of overshooting. With wheels and flaps lowered I found it best to make a steady approach at 90 kt, using just enough engine to achieve a smooth flare-out. "Over the hedge" speed can be reduced to about 85, and the check should be a gentle one, allowing the machine to trundle on its wheels with nose slightly raised at about 70 kt.

With the extra drag of floats, and its large frontal aspect, the Sealand loses speed quickly and pulls up in a surprisingly short distance. Care must be taken not to rely too much on brakes which have recently been subjected to water operations, for these will sometimes be found to be ineffective until properly dried out. The landing presents no difficulty, although an attempt to bring off a three-pointer in gusty conditions may end in a rather aggressive bounce.

All things considered, the Sealand is most definitely a pilot's aircraft and although, perhaps, it should not actually be recommended as the ideal type for inexperienced people, any reasonably intelligent pilot can quickly convert. The water-handling technique, the makers state, can normally be mastered in 10 to 15 hours. It is certainly safer and easier to fly than any comparable type on which I have had experience.

If I have any criticism it would merely concern minor points such as the fact that on this particular example the flap selector was not quite positive enough in finding its "gates," and that the control locking device was apt to jam.

Its docility is by no means the Sealand's sole virtue, for if the pilots like it, so too will operators who avail themselves of its exceptional versatility and economy of operation. Although the Sealand in its present form could do with a little more "urge," it is still, in fact, a very safe aircraft whose performance is quite adequate for the type of work for which it has been designed. There is also, of course, a pure flying-boat version in which the absence of an undercarriage permits an increase of 1,000 lb in payload.

SHORT SEALAND

Two D.H. Gipsy Queen 70-3, 345 h.h. for take-off

Wing span	61.5ft
Overall length (tail down)	42ft 7in
Height (tail down)	14ft
Aspect ratio	10
Wing loading	25.78 lb/sq ft
Power loading	13.38 lb/h.p.
Rudder area	45.16 sq ft
Gross weight	9,100 lb
Track	10ft 6in
Max beam	5ft 3in
Draught (at 9,100 lb)	2ft 6in
Max speed	161 kt at 5,000ft
Max w.m. cruising speed	147 kt at 8,000ft
Recommended cruising speed	110 kt
Stalling speed (power off)	59 kt
Climb to 10,000ft	12 min
Take-off to 50ft (I.C.A.N.) from water	1,020yd
Take-off to 50ft (I.C.A.N.) from land	750yd
Payload (4 pass., baggage, and 145 lb freight or mail)	893 lb
Range, with 5 passengers and baggage, at 110 m.p.h.	522 nautical miles

R.Ae.S. COUNCIL MEMBERS

AT the recent annual general meeting of the Royal Aeronautical Society, Major F. B. Halford, C.B.E., F.R.Ae.S., took office as president for 1951-52. Mr. Sydney Camm, C.B.E., F.R.Ae.S., and Mr. G. R. Edwards, M.B.E., B.Sc., F.R.Ae.S., were elected as vice-presidents, and a later announcement from the Society adds the name of Mr. G. H. Dowty, F.R.Ae.S.

The following were elected to fill vacancies on the Council: A.Cdre. F. R. Banks, C.B., O.B.E., F.R.Ae.S., Mr. E. B. Dove, A.F.R.Ae.S., Mr. G. H. Dowty, F.R.Ae.S., Dr. E. S. Moult, Ph.D., B.Sc., F.R.Ae.S., Mr. W. E. W. Petter, B.A., F.R.Ae.S., Mr. J. G. Roxburgh, Grad.R.Ae.S., and Mr. W. Tye, O.B.E., B.Sc., F.R.Ae.S.

ANNULAR NOZZLE VAPORIZER

THERE are cogent arguments for the employment, in gas-turbine combustion chambers, of vaporizing media instead of the rather more widely used atomizing nozzles, but one of the difficulties associated with vaporizing tubes is the provision of equable distribution of the fuel injected. It is to overcome this difficulty that a new form of vaporizer has been developed at A. V. Roe Canada, Ltd., by Mr. F. D. M. Williams.

In essence, Mr. Williams' development is simple. He has merely arranged that the outlet mouths of the cluster of "walking stick" vaporizer tubes discharge into a common annular nozzle. This nozzle is so constructed that the vaporized fuel is ejected in the form of a vortex directed upstream into the flame zone. It is claimed that the vortical nature of the flow induces an additional flow of air in the core of the vortex to give more complete combustion.

It is additionally claimed that the central nozzle not only provides for better mixing of the fuel before injection and better control over the pattern of flow in the combustion chamber, but that it also results in a stronger structure in that it provides unified support for the vaporizer tubes at their upstream ends. Further details of the vaporizer are available from Avro Canada, Malton, Ontario, or from Canadian Patents and Developments, Ltd., of Ottawa.

I.A.T.A. AND THE POLICE

ANOTHER aspect of the work of I.A.T.A. is seen in newly achieved process of co-operation with the International Criminal Police Commission. Through this measure it is intended to improve the safeguarding of international air shipments, help to prevent smuggling and simplify police formalities at international airports. As a result of conversations with the I.C.P.C., I.A.T.A. has now undertaken to determine the views of its member airlines on security and represent them to the police agency.

Explaining the Association's move, Sir William Hildred has pointed out that the negligible incidence of pilferage involving airline cargoes is already reflected in the low insurance rates on goods shipped by air. I.A.T.A intends to ensure that this will remain the case, not only by maintaining its own security services, but by following a policy of the closest co-operation with national and local police authorities.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

No Dice?

I WAS one of a large crowd watching some jets banking steeply within the perimeter of an airfield. Their height was approximately nought feet. The wisp of dust which the wing tip of one of them was disturbing on the surface of the field became a swelling serpent. We roared as one man when the aircraft, one wing tip still vertically above the other, slid skilfully to a wavering standstill in front of the V.I.P.s' enclosure.

My search for sleep compels me to seek reassurance by asking some questions.

Have we not been projecting these high-speed missiles in the general direction of valuable persons and equipment long enough? Ought we not to pause and consider whether the conditions in which low demonstration-flying became the accepted thing still exist? Ought we not to stop and do some little calculations involving masses and squares of velocities, densities of population near airfields and costs of modern aircraft?

Are the dirtier darts still justifiable as pieces of slap and tickle? Should the nature of these demonstrations remain unaltered while the speed, and therefore the radius of potential destruction, increases? Ought we passively to await the event in which many are slapped but few are tickled? Might it not be that Nemesis, armed with sheaves of self-justifying statistics . . .?

Or am I just a bed-borne pessimist for whom the fearful thrill has become more fearful but less thrilling?

Manchester. C. OLDE SWEAT.

[It should, perhaps, be revealed that the writer himself, as a pilot, has indulged in many such "dirty darts" to the delight of the assembled citizenry.—ED.]

Flight Simulators

WITH reference to Mr. Adorian's letter in *Flight* of April 20th, it appears I have failed to make it clear to him that I have been referring to flight simulators (similar to the one described in *Flight* of March 9th, 1951) and not to synthetic-training devices or to projects put forward.

If the firm he mentions had built flight simulators for the R.A.F. as far back as 1940, I think that I should have heard or seen something of them during the last war when, by good fortune, I had the honour to be a member of the R.A.F. team that, unaided by any civilian establishment, designed and produced the St. Athan flight simulators to which I have previously referred. In the course of our duties we were privileged to visit various training establishments, attend synthetic-training conferences, and inspect many synthetic-training devices, but in all our travels we saw only one other type of flight simulator and that was designed by a member of the R.A.F. Nor did we hear of any other type from the many who visited our establishment (our visitors ranged from the Under-Secretary of State for Air to the general public).

It is these facts that convince me that the R.A.F. was first to build and use flight simulators.

If Mr. Adorian is referring to projects put forward, the basic design of the type to which I have referred was started in September 1939 and was first put forward in 1940; it was due to the difficulties of the "usual channels" that production was not started until 1942. If he is referring to synthetic-training devices, did not these start during World War I, when "Penguins" were used for pilot training?

Canterbury. FRANK WITTWER BARLING.

Desert Crossings

YOU will, perhaps, be kind enough to record my apologies on some of the points raised by Commandant Clavel in his letter (June 15th) concerning my recent flight through Agadir on the way to Angola ("Angola by Aerovan," May 4th). However, I hasten to mention that the facts reported were not so considerably different, though in any condensed story it is often difficult to avoid giving a wrong impression.

In the first instance, the Aerovan in question was carrying a Bendix Command Liaison H/F. radio set (as used on wartime C-47s), tunable in the air to any frequency on the 6-9 mc/s band, and fitted for both R/T. and W/T. The range of this set on voice in the static-free conditions of West Africa is quite often over 200 miles. Nonetheless, on landing at Agadir, and realizing the value of radio for the next hop, I asked if the set could be tuned on the ground there. A petty officer radio mechanic from the Commandant's unit kindly did this job for me, and tested the radio with a Catalina aircraft and Agadir Control. The H/F. set and frequencies were naturally written-in when I made out my flight plan. Also mentioned was the fact that three people were on board, viz., myself, the co-pilot (an instructor of the aero club that bought the aircraft) and his wife, listed as "supernumerary." In any case, her name was at all times written in the journey log and on any manifests that were handed out.

Emergency tinned food was carried, and water, although water was not up to the required scale. When this objection was raised, I immediately offered to find some bottles and a tap. Flares and shelter were not carried, but then complete Service desert equipment is a very comprehensive and heavy kit: many light aircraft would have difficulty in carrying the load.

The most important point, I think, is this. When an aircraft is being prepared for a long flight, the pilot or company apply through M.C.A. for clearances, giving details of the aircraft, radio, crew, equipment, etc. We took this step and were cleared by all foreign authorities to make the flight, and the French Consulate in London would not issue crew visas for West Africa until M.C.A. obtained clearance, which they did.

I know that, a few days previous to my visit, a small private aircraft went down in the desert and that air-sea rescue services had to search for it. They succeeded in saving this machine and crew, but were naturally wary of light aircraft.

Perhaps the Commandant would like to read extracts from my technical report to the Royal Aero Club Aviation Centre, offered as advice to future light aircraft pilots on the same routes:—

"M.C.A. ask for details of equipment carried and pass these details on to foreign authorities. The snag on the West African route is landing permission for light aircraft on the section from Ifni to St. Louis, as this is all desert coast and aircraft are normally compelled to carry radio, desert equipment, food, water, special maps and sundry items. Nevertheless, permission is often granted to a machine which does not carry all these items of equipment. I have flown the route three times—in a Gemini, Marathon and an Acrovan—and at no time have all the items of equipment been carried. Nonetheless, when permission is given by the French (if clearing from Agadir) or the Spanish authorities (if clearing from Ifni) to make the flight across this desert section, the pilot should ask M.C.A. to obtain some sort of a certificate of authority, otherwise he may find himself uncomfortably delayed.

"The same difficulty as experienced at Agadir and Ifni might be encountered at Cape Juby or at Villa Cisneros, or even as far down as Port Ettiene.

"The precautions imposed by the authorities are well merited, because this section of the route is very much 'win or bust.' There is nowhere to walk to if one makes a forced landing. It would only be possible to wait with the aircraft and trust to the air-sea rescue units. Therefore, I strongly advise a light aircraft pilot to fly coastal all the way, or be sure that he knows the flight by checking with Flying Control, both verbally and on the flight plan, that if he is going to force land, it will be on the coast. Even camels don't appear to live in this section!"

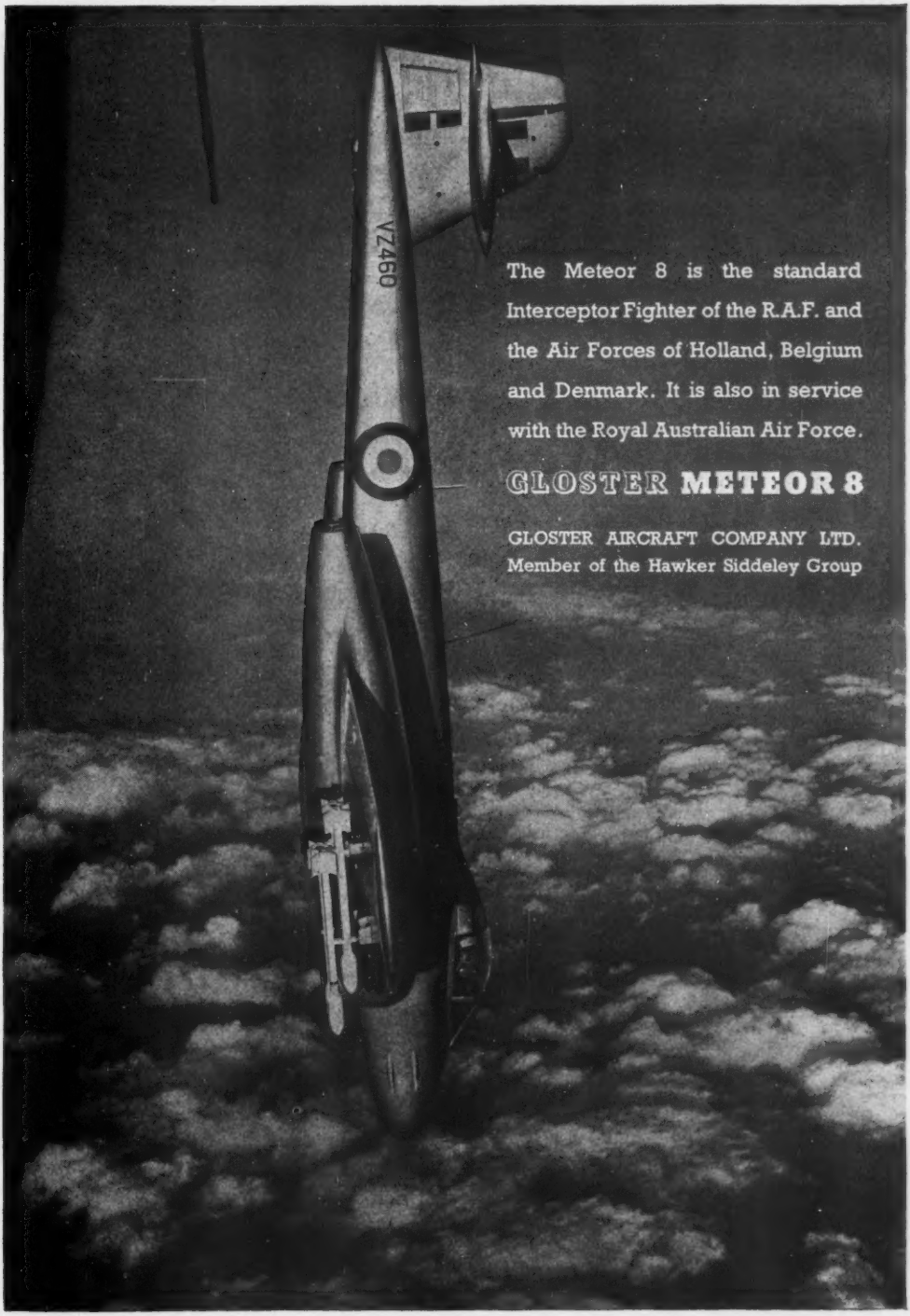
Finally, I was cleared the previous day by civil control and returned to Agadir due to bad weather. I was cleared by civil control on the day concerned, and was only waiting for a dust pall to move away before take off when the intervention took place. The question of running out of daylight then arose, and I arrived at Villa Cisneros only 15 minutes before dark.

Perhaps my R.Ae.C. report will, in a small way, help to clear the misunderstandings for future flights, making work easier all round. Finally, I must apologize for the error of mistaking a naval officer for an air force officer.

Twyford, Berks. MARTIN CHERRY.

FORTHCOMING EVENTS

June	23.	R.Ae.C.: Festival of Britain National Air Races, Hatfield.
June	24.	International Rally, Pisa, Italy.
June	24.	Northern Heights Model Flying Club: Gala Day, Hawker Airfield, Langley.
June	27-28.	Institute of the Aeronautical Sciences: Annual Summer Meeting, Los Angeles.
June	30-	Cognac International Rally, France.
July	1.	
June	30-	R.Ae.C.: Members' Deauville Rally.
July	2.	
July	1.	International Rally, Savona, Italy.
July	4-11.	F.A.I. Committee Meetings, Brussels.
July	7-8.	R.Ae.C.: Members' La Baule Rally.
July	7-8.	International Wakefield Cup Model Contests, Finland.
July	14.	Bristol Corporation: Air Race Meeting.
July	14.	S.M.A.E. Festival of Britain Model Championships, Wembley.
July	15-18.	Royal Danish Aero Club: Rally.
July	15-22.	Aero Club of Italy: International Air Week.
July	16-20.	Aeronautical Union of Jugoslavia: International Parachute-Jumping Competitions.
July	19-21.	*Daily Express* and R.Ae.C.: International Rally and "Fifty Years of Flying" Display and Exhibition.


VZ460
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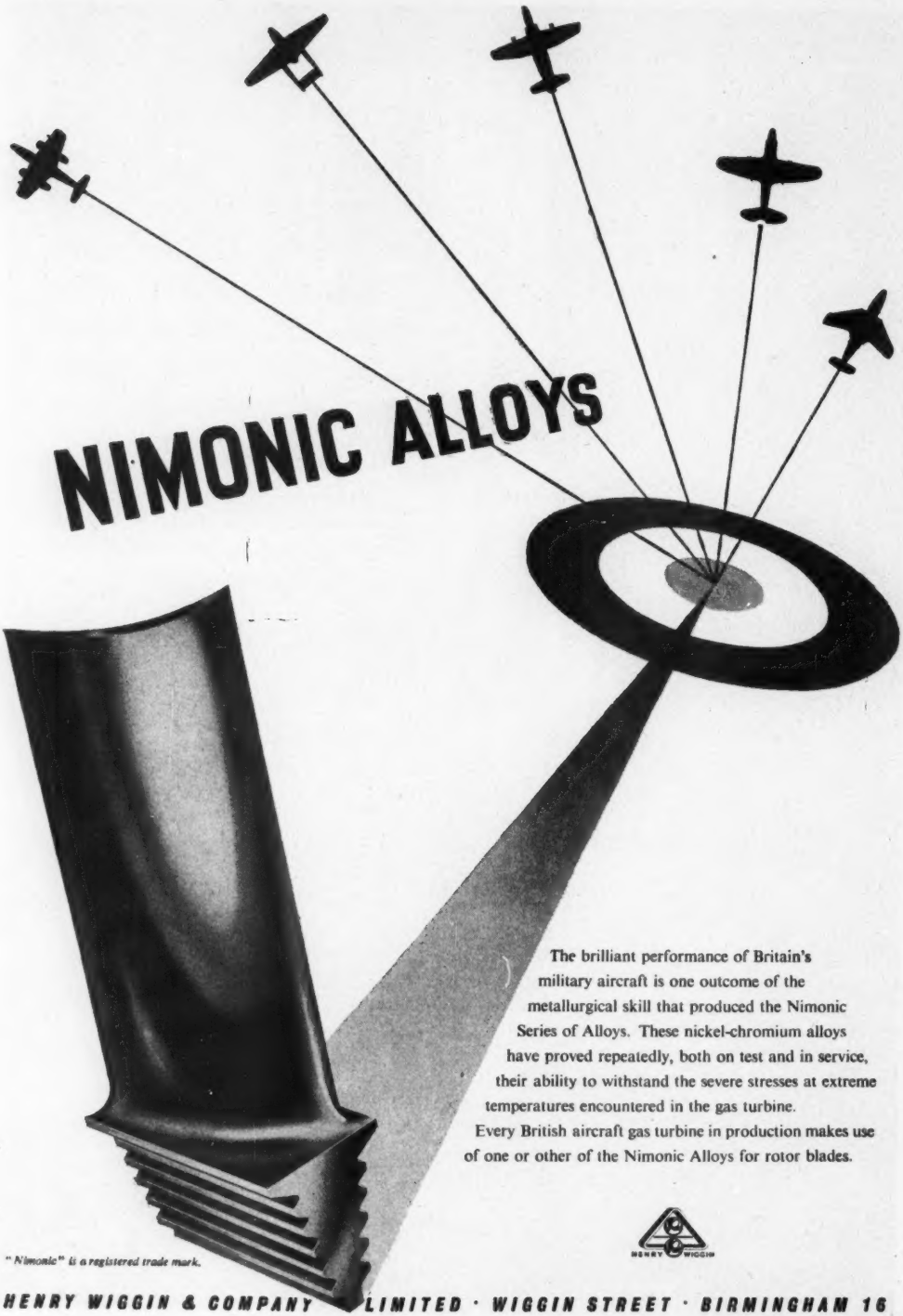

NIMONIC ALLOYS

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Every British aircraft gas turbine in production makes use of one or other of the Nimonic Alloys for rotor blades.

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Commercial Aviation Commentary

By ALLEN GALE

THIS feature, which will appear from time to time, is contributed by one who is engaged in the airline business in a practical and active capacity. The views he will express on commercial-aviation affairs are entirely his own.

A CURRENT headache for airline operators is the question of third-class travel. "Air-coach" travel, as they call it in America, seems to have originated in that country in response to the efforts of the non-scheduled operators to find some method of enticing customers away from the larger, old-established airlines. As far as one can gather, its inception was not greeted by any cheers except from those people who benefited from the low fares and from the "non-sked" men themselves. Operating with low overheads, second-hand aircraft and organizations supported by the proverbial shoestring, these airlines were able to make substantial reductions in fares and to this extent were able to make air travel available to a lot of people who otherwise would have gone by car, bus or train.

So popular did these flights become that the regular airlines, loath to miss a good money-making proposition, began to run their own coach services; and from all reports they are doing pretty well at it.

* * *

PAN AMERICAN were planning to introduce a resolution at the I.A.T.A. conference at Bermuda which would permit coach travel on the North Atlantic in 1952. Apparently they intend to operate a daily coach service with 55-seater DC-4s, and T.W.A. have indicated that if this is the case they will run a similar service. A lot of opposition to this resolution was developing, chiefly because the majority of transatlantic operators, while not interested in coach travel, are aware that if one of their number starts they may well have to do likewise in self-defence.

It's not difficult to see why so many of the airlines dislike the idea. They figure (and probably quite rightly) that the low fares will attract passengers from the normal services, as indeed they did on the domestic routes in the U.S.A. to some extent. What will happen on the North Atlantic is anybody's guess; and which way the guess goes depends upon whether one is optimistic about traffic increases.

If one looks at some of the present traffic figures for the North Atlantic the picture does not seem so rosy as it was undoubtedly painted by P.A.A.—who, incidentally, had plenty of support from the C.A.A.—and I feel that those delegates at Bermuda who opposed the idea may have been more realistic than the sponsors. According to statistics published for 1950, some 316,827 people crossed the Atlantic by air as against 691,195 who preferred to go by sea. P.A.A.'s project for a daily coach service, assuming that it stimulates T.W.A. into similar activity, will increase the number of seats offered on this route by another 132,080; and this, of course, does not take into account the possibility of other operators entering the market. However optimistic one may be over the future of air transport it does not seem very likely that there will be a sudden jump in passenger demand to the extent of another hundred thousand or so by next year. This being the case, it looks as though a lot of coach seats are going to be filled at the expense of the normal flights—which won't please many operators one little bit.

Another fact of which many airlines are conscious is that not all of them are suitably equipped with aircraft to enter the new field, and with second-hand aircraft values at a new high they might find it difficult to get any. An idea of this inflated aircraft market can be got from the price which Eastern Airlines recently paid for a second-hand DC-4 purchased from the C.A.A.—a trifling sum of £126,700. One recalls that, not so very long ago, similar aircraft were changing hands for about £40,000 to £50,000.

* * *

IF and when these coach services start over the North Atlantic it seems certain that they will have to be routed by Keflavik in Iceland, and this fact alone will be sufficient to start a new thatch of grey hairs on the heads of airline operations executives. Perhaps this Keflavik business needs some explanation. One of the reasons why transatlantic air travel is able to achieve a fair degree of reliability is because the operators have a generous choice of routings. Thus, when an aircraft is unable to fly *via* Gander it can operate *via* Stephenville or Moncton, and when headwinds prevent a direct crossing from being made it can go *via* the Azores or Iceland. In other words, the route has become a commercial and operational success mainly because the airlines have been given such a large degree of flexibility in their flight planning. Now, were coach-service payload and equipment considerations to force a single routing through Keflavik, all this flexibility would vanish in a flash, and with it the chances of securing any real reliability. With their high-density seating, a few "coaches" grounded in Prestwick or Shannon because of Iceland's weather are likely to strain the passenger-handling facilities at these places to the limit, if not beyond it. All in all, P.A.A. seem to have posed some pretty problems.

One other point which is of some interest is whether or not the introduction of air-coach travel on the North Atlantic would be likely to spread to Europe, if only for the purpose of providing connecting services. In view of the fact that most of the objections to coach travel—poor seating, poor food (or none at all), tough schedules, and so forth—decrease in direct proportion to the overall flight-time it seems that such services might enjoy tremendous popularity and affect the load-factors on the regular services. It would be interesting to know how short-haul operators on this side of the Atlantic feel about it, and whether they would welcome a swift rush by their customers towards third-class travel. My own reactions are that it might not be a bad idea.

* * *

NOT so long ago, about twelve years to be exact, a pilot with 300 hours' flying time, a "B" Licence and a Second-class Navigator's Certificate could walk into any aircraft operator's office in this country and be greeted with open arms and a job. A few years later 3,000 hours and a First-class Navigator's ticket wasn't enough in many cases. Pilots had become a glut on the market. No account was taken of the fact that such men had air experience which had cost many thousands of pounds to obtain and that of all this large sum no portion was chargeable to the airline concerned: the armed Services had paid the whole bill. The airlines were full up, and that's all there was to it. Now, however, the picture seems to be changing again and, like the fruit trees after a May frost, the pilot-market seems to have been nipped in the bud. Quite a number of men, viewing the opportunities with a jaundiced eye, have got out of the business altogether; many have gone back to the R.A.F.; and most of the remainder seem pretty determined to stay where they are. Certainly, only a quick glance is needed at current salaries and cost of living indices to appreciate the point that a Service pilot is much better off than his civilian counterpart. Hence there is not likely to be any rush to fill the gaps when the top echelon of airline pilots retires.

This being so, the airlines, and especially the Corporations, are going to find themselves in a quandary. You can't train an airline pilot overnight.

One would have thought that the smartest move at this stage would have been to soak up all the available pilot-material against the day when it will be really needed. This, costly as it would be (since such men would inevitably be surplus to establishment, and therefore their salaries could not be written down by current operations) might still be less costly than starting from scratch in a year or so with a long and tedious *ab initio* training programme. And certainly the results, measured in pilot-efficiency, would be overwhelmingly favourable, at least for the next ten years.

CIVIL AVIATION NEWS

B.E.A. ACHIEVES TARGET

IN spite of poor winter traffic, British European Airways has achieved its revenue target of £9 million, and when the actual figures of the Corporation's 1950-51 accounts are published they will show that the deficit has been reduced from the previous year's £1,360,000 to approximately £980,000. An even smaller deficit had been hoped for, but increased petrol duty and devaluation has raised costs by some £700,000. These figures are quoted by Lord Douglas of Kirtleside, B.E.A.'s chairman, in a message to the staff.

Mr. Peter Masefield, the chief executive, commenting in the current *B.E.A. Magazine* on the delay in delivery of the Ambassadors and Pionairs, says that although the reasons are clear they were no less aggravating. On June 1st B.E.A. was six Pionairs short of the required minimum to operate the increased summer schedules, and some 22 out of the 809 weekly services were affected. (Details of these cuts were given in *Flight* for June 8th.) Teething troubles with the Ambassadors—Elizabethans in B.E.A. nomenclature—has set back the completion of the 250 hours of test flying with the production model which are necessary before a C. of A. can be granted. Up to May 28th 150 hours out of the 250 hours had been completed, and the difficulty now will be to find, before autumn, adequate conditions in which to complete the de-icing trials necessary before introducing the aircraft on the Corporation's winter schedules.

Mr. Masefield says there is no hope of introducing the Elizabethans into scheduled service before mid-October, which means missing the summer traffic and consequent forfeiture of revenue. He adds, however, that when the Elizabethans are eventually in service the Corporation will have a very fine and economical aircraft of great passenger-attraction.

Commenting on the chartering of Constellations and Argonauts from B.O.A.C. to cover the night services from London to Nice this month, Mr. Masefield says that at the cheap night fare of £25 return a 90 per cent load-factor in both directions will be necessary to pay for the charter. These four-engined aircraft are, of course, being operated by their own crews, and this will do something to ease the crew-shortage which, apart from aircraft scarcity, is one of the factors contributing to present difficulties.

Although, says the chief executive, B.E.A. has taken on over 100 first and second officers since September, it is still short of a dozen crews to meet the stepped-up summer schedules—this in spite of energetic recruiting and training and of the fact that the flying staff now consists of 471 captains, and first and second officers, compared with 379 a year ago. During the next two years, at least, the Corporation is also likely to be short of radio officers.

These remarks, incidentally, also serve to underline the comments of Allen Gale (p. 745) on the same subject.

VERTICAL ARRIVALS: This intimate view of Northolt was taken from a B.E.A. Westland helicopter; the circle seen on the apron marks the alighting-area. Since the inception of the service from London Airport to Birmingham via Northolt the "tarmac batsmen" have had to add some new movements to their repertoire. "Flight" photograph

CORPORATION TRAFFIC

THE volume of traffic carried by United Kingdom airlines during February, 1951 (statistics of which were published by the M.C.A. last week), showed a very substantial advance over that for the corresponding month in 1950, increases in passengers, mail and freight being 22.1, 9.9 and 38.5 per cent respectively. The Airways Corporations and their associates flew over 58 million passenger-miles, carrying 61,348 passengers, of whom 45,474 were flown on international routes. B.O.A.C. carried 3,803 passengers on its North Atlantic services—an increase of over 64 per cent compared with February, 1950—and the total number of 16,918 passengers carried in the month was an increase of nearly 40 per cent.

B.E.A. raised their freight figures from 563.5 tons in February, 1950, to 773.1 tons in February this year, and carried a total of 43,668 passengers during the month.

YAW RECOVERY

ISSUED by the M.C.A., *Information Circular No.* 70/1951 deals with structural loads imposed during yawing manœuvres. Explaining that civil aircraft are designed to withstand the loads imposed during all reasonable manœuvres and at all permitted flying speeds, the *Circular* adds, however, that there is an assumption that full rudder will be used only within a certain speed range, the upper limit of which is called the manœuvre speed and is approximately 1.6 times the flaps-up stalling speed. Above this speed, application of full rudder, or violent use of rudder, particularly when recovering from a large angle of yaw, might over-stress the structure sufficiently to cause failure. The *Circular* warns pilots of this fact, and suggests that initial action to recover from large angles of yaw attained unintentionally should be gradually to centralize the rudder, and follow this by the gentle application of opposite rudder until recovery is complete.

I.C.A.O. COUNCIL REPORT

AN informative review of the development of international civil aviation during last year is included in the 1950 report rendered by the Council of I.C.A.O. to the Fifth Assembly, which opened in Montreal on June 5th.

It is stated that the upward trend in world air-transport activity which had been noted the previous year continued during 1950. International and domestic scheduled airlines throughout the world (excluding Russia and China) carried slightly over 30 million passengers, or approximately 14 per cent more than in 1949. More than 100,000 pilgrims from all parts of the world were transported by air to Rome for the Holy Year celebrations, and the number would probably have been substantially higher but for the deterioration of the international situation at the height of the pilgrimage. Scheduled and non-scheduled airlines carried more than 14,000 persons to Jeddah for the pilgrimage to Mecca. Some 60,000 immigrants to Israel from other parts of the Middle East were transported by air, and an agreement had been concluded by which about 5,000 immigrants were to fly to Australia from the Netherlands during 1951.

Several important "domestic" points were raised by early speakers at the Assembly. Dr. Enrique Loaeza (Mexico) pleaded that the time had come when the structure of the divisions dealing with air-navigation matters should be reviewed; by combining some of the divisions, he maintained, the overall purpose could be fulfilled and considerable economies achieved at the same time.

Mr. J. E. Keel (United Kingdom) said that, while the vital need for rapid and efficient air communications between the free nations justified resolute support for I.C.A.O.'s work, it was essential that member-states should get full value for the effort and money they expended. This in turn meant that the organization must carry on its business "with the highest degree of realism, efficiency and economy."

M. Haguenau (France) said that the organization had attained greater success in its practical work in the navigation field than in general air-transport matters, for the reason that it was easier to achieve international unity in the former. He thought that funds and personnel should be re-assigned in order that greater attention might be devoted to those subjects in which less progress had been made.

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All a matter of Hot Air?

ONE of my dictionaries—and I shall consult scores of them before this article is completed—defines jet as . . . yes, here it is . . . "*a compact, velvet-black mineral* . . ." No, wait a minute . . . what's this? "*Jet propeller* (*Naut.*). *A device for propelling vessels by means of a jet of water ejected from the stern.*"

Well there's nothing very new in that: the squid's been jet-propelled for millions of years. D'you mean to say there's nothing in the whole dim volume about jets? Not even among the Addenda? Here, what's the date of this thing?

Very well; I shall have to make it up as I go along. Er . . . are we agreed that the gas-turbine jet engine will eventually prove at least as important to aeronautical progress as the original rotary engine, the variable-pitch constant-speed propeller, the highly supercharged engine using high-octane *Esso*, and high-tensile fatigue-resistant aluminium and other light alloys? We are? Good.

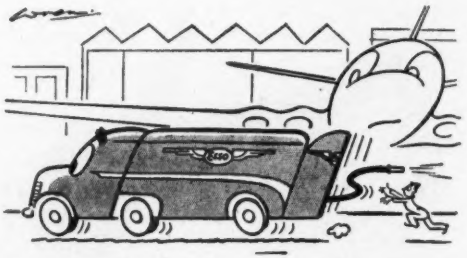
And are we agreed that a sketchy explanation of the scientific basis of jet propulsion might be that action and reaction are equal in magnitude but opposite in direction, that the force on a body is directly proportional to the rate of change of momentum of the body, or that (steady!) the propulsive thrust is proportional to the product of the mass of material ejected from the vehicle

and the amount its velocity has been increased in a given time? Excellent—let's settle for Newton's third law of motion.

"Jet propulsion" is used to cover a lot of ground and other natural elements. Rockets were used, I am told, as long ago as 1232 when they were applied to the defence of Kai-feng; at another period in history things called Buzz-bombs or Doodle-bugs were fairly common; and skyrockets have been the pyrotechnician's pride and joy ever since the invention of gunpowder.

Today there is much talk among escapists about the possibility of rocket space-ships, of interplanetary vehicles powered by liquid fuel—petrol plus liquid oxygen, say.

If, however, we are content, we little stay-at-homes, to travel *within* the earth's atmosphere we can economise by filching the oxygen needed for combustion from the air.



Now we're really getting somewhere. I've got as far as thermal-jet air engines. How about you?

For the sake of argument let's say that thermal-jet air engines include ramjets (flying stove-pipes or athodyds), gas-turbine jets, gas-turbine-with-geared-propeller-and-exhaust-jets, and supercharged-reciprocating-engine-with-geared-propeller-and-exhaust-jets. There are others, but their names are hopelessly unwieldy on this basis.

Now all of the above-mentioned engines burn fuel—not any old fuel, of course, but those specially concocted in the *Esso* laboratories. There are fuels for every type of internal combustion engine; fuels that are safe, efficient and economic; fuels that help the aircraft industry to design *better* jets; fuels given the okay for heat of combustion, freezing point, viscosity, distillation, flash point, aromatics, sulphur content, residue, accelerated gum, water tolerance and specific gravity.

No, it isn't only a matter of hot air—even though one jet, six inches in diameter, will release as much heat as several hundred oil burners.

Jets are still in their infancy—and so, let's admit it, are jet fuels. But the aircraft industry and the fuel philosophers are moving fast, getting to know the ropes and the lingo. And one very important lesson they've already learned is that . . .

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CIVIL AVIATION . . .

DECCA N.W. BRITISH CHAIN INAUGURATED

THE latest extension to the Decca Navigator system, the North-West British chain, was officially inaugurated on June 7th (as briefly recorded in *Flight* of June 15th) by Air Chief Marshal Sir Frederick Bowhill, C.B.E., K.C.B., C.M.G., D.S.O., master of the Honourable Company of Master Mariners.

With the master station sited at Kidsdale in Wigtownshire, the red station at Clanrolla in Northern Ireland, and the green and purple stations respectively at Low Buston, Northumberland, and Neston, Cheshire, the new North British chain extends the coverage of the existing system to embrace the whole of Ireland, the North-Western Approaches, Scotland, the Shetlands, and the northern waters of the North Sea.

The inauguration ceremony was conducted aboard the motor vessel *Royal Iris* as the ship proceeded seaward down the tortuous channel from the port of Liverpool, and in his speech Sir Frederick Bowhill said: "Since in my career I have filled the dual role of mariner and airman, I should like to touch on the use of Decca in the aviation sphere for, with the coming opening of the South-West British chain (due to be completed toward the end of this year), we shall have a highly accurate aid to navigation, not only over our coastal waters and approaches, but also over the great majority of our internal air routes, which will meet the requirements both of the high-flying jet aircraft and the low-flying helicopter."

Sir Frederick then went on to speak of the Decca Flight Log, which, he said, would not only tell the aircraft commander where he was on a form of map presentation, and what track he had made good, but would also be of great value to air-traffic control in safely achieving high movement-rates in the busy areas.

Of the reliability of the Decca system, Sir Frederick said that during the past year notified breaks in the transmission of the English chain had totalled only 96 seconds.

He went on to speak of the Track Guide and Integrated Track Range, developed by the Decca Navigator Company to meet the peculiar navigational requirements of aircraft flying along overseas routes. The Integrated Track Range, he said, had been tested on aircraft of the Ministry of Civil Aviation, and showed promise of becoming a most useful facility on our overseas air routes.

A system which provided navigational assistance both to marine and air transport and which, further, might help Britain to solve certain current air-traffic control problems was of the greatest use to the nation, continued Sir Frederick. Other countries were also becoming aware of the advantages provided by the system; a chain would be operational in Germany by next autumn, with siting so arranged as to meet, as far as possible, both aviation and marine requirements; the French, he understood, had also started erecting a chain, which would be ready next year.

"I am convinced that our next aim should be so to extend Decca coverage that it embraces the arteries of sea and airborne trade from the Hebrides and the Baltic to the Barbary coast and the Levant," concluded Sir Frederick Bowhill; he then declared the chain officially open.

Sir Norman Guttery, K.B.E., C.B., Deputy-Secretary to the Ministry of Transport, then made a broadcast to all ships, notifying them that the chain was fully operational and was approved by the Ministry of Transport for navigation.

Incidentally, in the final report of the Communications Division at the Fourth Session of the International Civil Aviation Organization (held recently in Montreal), the recommendation is made that "an operational evaluation of the Decca Navigator system be actively pursued in order that its suitability for inclusion in standards and recommended practices may be determined." It is further noted that "in view of the existing and projected chains in Western Europe, and in view of the experience of the system which is being gained there, the operational evaluation would be facilitated if it took place in the Eumed region."

The report also mentioned that the Division had noted the advanced stage which had been reached in the development of short-base variants of the Decca Navigator system, which development will produce lower-cost installation giving tracking or, alternatively, tracking and ranging facilities in those localities where the full system could not be economically or operationally justified.

BILINGUALISM AND AIRLINE SAFETY

GROUND-STAFF shortages in South African Airways, and their alleged connection with present Government policy—referred to in these pages some weeks ago—were discussed last week in the South African assembly.

The Minister of Transport, Mr. P. O. Sauer, was questioned by Opposition members about resignations among the staff and the effect they might have on operational safety. The Ministers replied that every precaution to ensure safety was still being taken.

"We understand that a large number of the staff, including highly-placed men, have resigned," said one Opposition member. "If so, the standard of maintenance might be affected. Has the incidence of emergency landings increased in past months? Are the Airways short of pilots, or are the staff required to fly longer hours than normal?"

Mr. Sauer admitted that the ground staff was not up to strength, but pointed out that this was not the first time it had happened. The establishment of ground staff should be 855, but the present number was 734.

As far as he knew, there had been no increase in the number of emergency landings. He denied that it was a strict requirement that all members of the staff must be bilingual.

The general policy for employment by the South African Government is that both English and Afrikaans are required, but if there is a shortage of staff, anybody will be recruited, whether he is bilingual or not. This particularly affects immigrants.

BRITAIN'S SPOKESMEN: Representing the United Kingdom's viewpoint at the fifth session of the I.C.A.O. assembly held in Montreal last month were (left to right, front) Mr. J. E. Keel, head of delegation; Mr. J. McCaig, delegate; (rear) Miss E. J. Stoker, secretary to delegation; Mr. I. V. Pugh, delegate.

BREVITIES

THE first of the two Comets being built for Canadian Pacific Air Lines will operate on the 5,200-mile route from Honolulu to Sydney, Australia.

* * *

Alitalia introduced on June 6th a new fortnightly service on their Rome-Buenos Aires route.

* * *

To improve the exterior lighting of aircraft and provide an extra safeguard in navigation, United Air Lines are testing a high-intensity rotating red light on one of their DC-6 Mainliners.

* * *

G/C. Stuart Campbell, R.A.A.F., Australia's Director of Air Navigation and Safety, has been appointed aviation adviser to the Siam Government by I.C.A.O.

* * *

Meteorological stations serving West German airports are now again managed by Germans. The last three outstanding were those of Hamburg, Dusseldorf, and Wahn airports. They were returned to German hands on June 1st.

* * *

Mr. S. M. A. Bannister has been appointed private secretary, and Mr. W. A. Penn, assistant private secretary, to the new Minister of Civil Aviation, Lord Ogmore. Mr. K. J. Willoughby is private secretary to the Permanent Secretary.

* * *

Work has now begun on the 400ft extension to the west end of Prestwick Airport's main runway which, when completed, will provide a usable length of 7,000ft for aircraft taking off to the east. The secondary runway is now in use again after resurfacing.

CIVIL AVIATION . . .

On June 3rd a B.O.A.C. Hermes left London Airport for the Gold Coast to make the Corporation's 1,000th round crossing of the Sahara Desert between the U.K. and West Africa. B.O.A.C. began operating this desert route in September, 1947, with ten-seater Halton converted bombers which were subsequently replaced by Avro Yorks and, last August, by Handley Page Hermes.

* * *

The following changes in civil aircraft nationality markings have been notified to I.C.A.O.: from April 16th aircraft registered in Taipeh will have prefix "B" instead of, as previously, "XT". Iran has chosen "EP", while the Governments of Saudi Arabia and Syria have approved the change of their national letter groups from "SA" to "HZ" and "SR" to "YK" respectively.

* * *

The Monarch Stratocruiser transatlantic service operated by B.O.A.C. is proving popular. Twice weekly *en route* calls at Boston, Mass. are provided by some of the London-New York and return services, and these have been particularly welcomed by travellers to the Festival of Britain. B.O.A.C.'s chairman recently announced that the Corporation's North American transatlantic services had earned 5.6 million dollars during the past twelve months, a 67 per cent improvement over the figure for the previous year.

Trans World Airlines have started a new service from London to Detroit and Chicago. It originates from Frankfurt, leaving on Sundays, and the return flight from Chicago leaves each Friday.

* * *

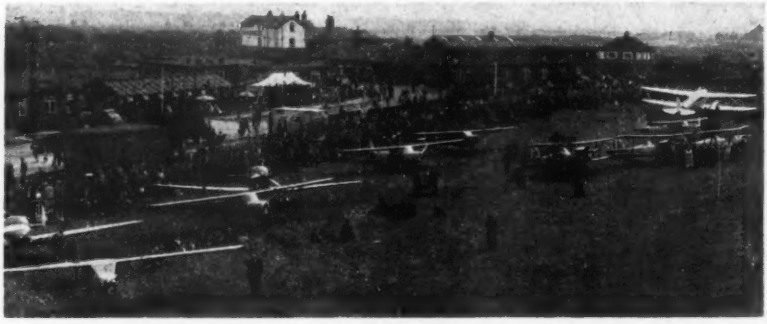
Mr. Vivian C. Varcoe, O.B.E., has been appointed assistant manager of the aviation department of Shell-Mex and B.P., Ltd. Mr. Varcoe is an ex R.F.C. pilot and frequently flies the company's Messenger on business flights throughout Britian.

* * *

S/L. L. C. Giles is to be general manager of Bahamas Airways, Ltd., a subsidiary of B.O.A.C. S/L. Giles served in the R.A.F. from 1931 to 1946 and has logged 4,400 hours as pilot and navigator of military and civil aircraft. Since December, 1948, he has been deputy director and chief operations officer of the Department of Civil Aviation in the Bahamas.

* * *

In the House of Commons on June 14th, Mr. Perkins (Cons., Stroud and Thornbury), asking what was the Government's policy in regard to making periodical reviews of public corporations, instanced B.O.A.C.—there had been no inquiry into its workings during 12 years, he said. He advocated an open inquiry on the lines of that concerning the B.B.C. Mr. Attlee said that normal operations in B.O.A.C. had not begun until 1947. There had been internal inquiries and he thought it would be a mistake to have another inquiry at present.



RALLYING ROUND: Seen from the control tower at Barton Wood airport (Manchester) are some of the visiting aircraft which supported the Lancashire Aero Club's display and "At Home" on Sunday, June 10th. Pilots of the celebrated Patrouille d'Etampes—whose Stampe biplanes can be seen towards the right of the picture—were among those who contributed to the success of the afternoon.

R.Ae.C. AVIATORS' CERTIFICATES

BELOW is a further list of R.Ae.C. Aviators' Certificates, covering the period from April 12th, 1951, to May 9th, 1951. The previous list appeared in *Flight* of May 18th.

The R.Ae.C. has issued an amendment concerning two previous Certificates. No. 27,000 was granted to the 100th A.T.C. "Flying Scholarship" cadet, Alan Smith (Newcastle Aero Club), and No. 27,033, which had originally been issued to Alan Smith, now goes to D. Mackay, of the same club.

No.	Name	Club or School	Date
27,100	Hamish Ean Adam Douglas-Reid	Qualified Service pilot	12.4.51
27,101	Alan Derek Piggott	Qualified Service pilot	12.4.51
27,102	Gerald Hugh Benton	West London Aero Club	16.4.51
27,103	Thomas Northey Paddon	Plymouth Aero Club	16.4.51
27,104	Michael John Bendall	Portsmouth Aero Club	16.4.51
27,105	Frank Walter Seymour	Denham Aero Club	17.4.51
27,106	Roy Francesco Salvadori	Herts and Essex A.C.	17.4.51
27,107	Peter Michael Warren	Marshalls' Flying School	19.4.51
27,108	Roland Louis Ernest Burton	Qualified Service pilot	19.4.51
27,109	Richard Oliver Ryall Toop	Plymouth Aero Club	19.4.51
27,100	Geoffrey Brian	Cheltenham Aero Club	19.4.51
27,111	Edward David Frith	Yorkshire Aero Club	19.4.51
27,112	Michael Conroy Whitworth	Yorkshire Aero Club	19.4.51
27,113	Robert Denis Borrill	Yorkshire Aero Club	19.4.51
27,114	David Brookfield Woodruff	Yorkshire Aero Club	19.4.51
27,115	Arthur Stanley Henn	London Aero Club	19.4.51
27,116	Mervyn McCord	Ards Aero Club	19.4.51
27,117	Robert John Carson	Ards Aero Club	19.4.51
27,118	Douglas Arthur Austin	Cheltenham Aero Club	19.4.51
27,119	Anthony Fetherston	Southend Flying School	20.4.51
27,120	Alec Edward Chopping	Airways Aero Club	23.4.51
27,121	Gordon Joseph Horne	Qualified Service pilot	23.4.51
27,122	Jack Randell	Airways Aero Club	23.4.51
27,123	Wallace Reginald Cornes	Christchurch Aero Club	23.4.51
27,124	Harry Wilson Turner	Cheltenham Aero Club	23.4.51
27,125	Andrew Sachnovsky	Qualified Service pilot	24.4.51
27,126	Brian George Cox	Rochester Flying Club	26.4.51
27,127	Israel Stern	Qualified Service pilot	26.4.51
27,128	Sydney Harry Heyworth	Lancashire Aero Club	26.4.51
27,129	George Kynoch	Strathtay Aero Club	26.4.51
27,130	Jeremy Farwell	Exeter Aero Club	26.4.51
27,131	Norman James Glass	R.A.F. Cranwell	26.4.51
27,132	John Michael Anthony Parker	R.A.F. Cranwell	26.4.51
27,133	Cecil Crook	R.A.F. Cranwell	26.4.51
27,134	Edward Arthur Peters	R.A.F. Cranwell	26.4.51
27,135	Desmond Patrick English	R.A.F. Cranwell	26.4.51
27,136	Michael John Corner	R.A.F. Cranwell	26.4.51
27,137	Richard Heron Robson	R.A.F. Cranwell	26.4.51
27,138	George Malcolm Cowper	R.A.F. Crahwell	26.4.51
27,139	Christopher John Clayton	R.A.F. Cranwell	26.4.51
27,140	Trevor Singleton Chaplin Jones	Wiltshire S. of F.	27.4.51
27,141	Greville Lawson Jacques	Cheltenham Aero Club	30.4.51
27,142	Richard Augustine Twomey	Qualified Service pilot	30.4.51
27,143	John Daniel Trainor	Redhill Flying Club	30.4.51
27,144	Charles Martin	Rochester Flying Club	3.5.51
27,145	Maung Tun Aung	Blackpool and Fylde A.C.	3.5.51
27,146	Francis Leonard Thompson	Qualified Service pilot	3.5.51
27,147	James Charles Douse	Christchurch Aero Club	3.5.51
27,148	Alexander McKay Sinclair Steedman	Qualified Service pilot	3.5.51
27,149	Dennis Albert George Sargent	Qualified Service pilot	3.5.51
27,150	Michael Rupert Thomas Chandler	Qualified Service pilot	3.5.51
27,151	William James Easterbrook	Qualified Service pilot	3.5.51
27,152	Hubert Desmond Hall	Qualified Service pilot	3.5.51
27,153	Luke Fyfe Sharp	Strathtay Aero Club	3.5.51
	D. Mackay	Newcastle Aero Club	3.5.51
27,154	Anthony Goadby	No. 2 Flying Training School	3.5.51
27,155	John Richard Hall	Yorkshire Aviation Country Club	8.5.51
27,156	Ian Johnston Maclean	Airways Aero Club	8.5.51
27,157	Ronald Hunter McArthur	Qualified Service pilot	8.5.51
27,158	Cyril Vincent Symons	Cheltenham Aero Club	8.5.51
27,159	Gordon Reginald Poulter	Fairoaks Aero Club	8.5.51
27,160	Dennis Sydney Sykes	R.A.F. Syerston	8.5.51
27,161	Raphael George Wigley	R.A.F. Syerston	8.5.51
27,162	Glyn Edward Sims	Qualified Service pilot	8.5.51
27,163	Francis Roth, Jnr.	Qualified Service pilot	8.5.51
27,164	George Walker Stables	Cambridge Aero Club	8.5.51
27,165	Michael William Norman	Cheltenham Aero Club	8.5.51
27,166	John Robert Taaffe	Wolverhampton A.C.	9.5.51
27,167	Michael John Brett	Cambridge Aero Club	9.5.51
27,168	Robert Chadwell Dorman	Cardiff Aero Club	9.5.51

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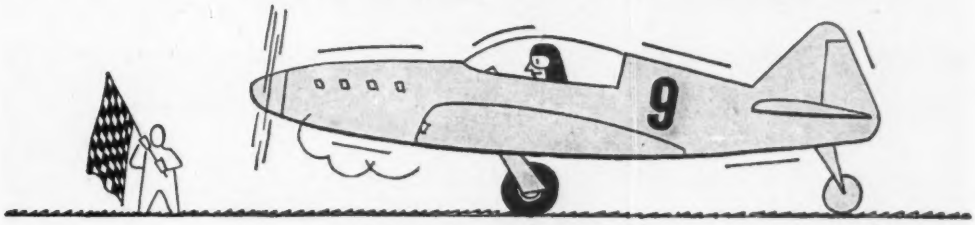

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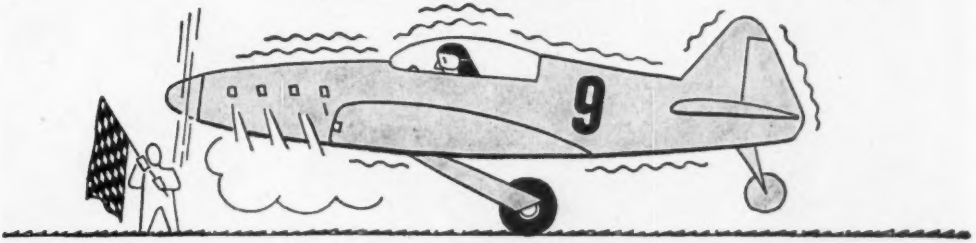

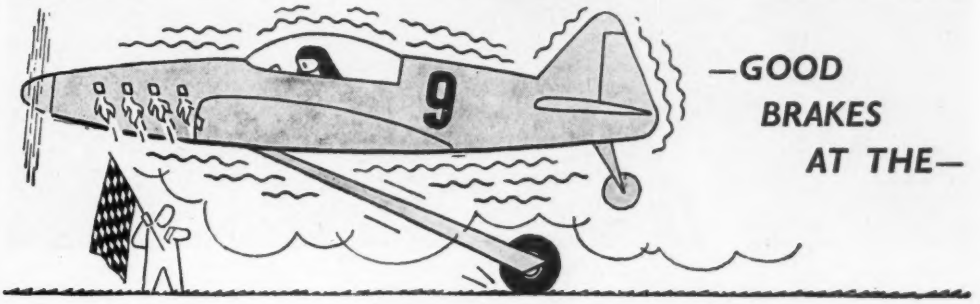

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SERVICE AVIATION

Royal Air Force and Naval Aviation News

R.A.F. Annual Bisley Meet

LAST week's R.A.F. S.A.A. meeting was certainly the biggest—and many thought the best—ever held. No fewer than 1,600 competitors came from 173 stations. The statistical section had to handle some 24,800 squadding cards in addition to over 12,500 sweepstake tickets. The standard of shooting was very high and, owing to the number of ties, many competitors had to be counted out. Principal results were :—

Apprentices' and Boys' Match (S.R.a).—1st, "A" Squadron, Cranwell (321); 2nd, "A" Squadron, No. 1 (A) Wing, Halton (320).

Apprentices' Championship (S.R.a).—1st, Cpl. A/A. D. M. Fletcher, Cranwell (88); 2nd, L/A/A. Nash, Halton (87).

University Air Squadrons' Match (S.R.b).—1st, Nottingham University Air Squadron (754).

Tyro Challenge Cup (S.R.a).—1st, Cpl. F. W. Mayer, Sutton Coldfield (116); 2nd, F/L. Searle, Old Sarum (115); 3rd, F/L. R. Hebbourn, Scampton (112).

Non-Tyro Match (S.R.a).—1st, F/L. C. W. Smith, Thorney Island (117); 2nd, Sgt. L. Snelgrove, Lyneham (116); 3rd, W/O. A. Wright, Kirkham (116).

Old Comrades Challenge Cup.—1st, S/L. C. L. Stevens (136); 2nd, W/C. W. V. Dumbreak (136).

R.Aux.A.F. and R.A.F.V.R. Challenge Cup (S.R.b).—1st, Cdt. Plt. B. T. Griffiths (140); 2nd, G/C. R. C. Hockey (128).

Station Rifle Match (S.R.a).—1st, R.A.F. College, Cranwell (1,200); 2nd, St. Athan (1,185); 3rd, Leeming (1,180).

Revolver Tyro Match.—1st, Cpl. B. Creasey, Gosport (90); 2nd, F/L. C. C. Smith, H.Q. Fighter Command (85); 3rd, Sgt. Ilsley, Shawbury (84).

Station Revolver Team Match.—1st, H.Q. Fighter Command (328); 2nd, A.T.D.U. Gosport (316); 3rd, Kirkham (313).

Squadron Revolver Team Match.—1st No. 43 (F) Squadron (198); 2nd, No. 83 (B) Squadron (161); 3rd, No. 224/269 Squadron (149).

Squadron Rifle Team Match.—1st, No. 83 (B) Squadron (611); 2nd, No. 54 (F) Squadron (541); 3rd, Calibration Squadron (538).

Rifle Twenty Match.—1st, S/Tech. Breislin, Wyton (145); 2nd, F/S. Vivian, Chivenor (142); 3rd, Cpl. Bohannan (142).

Command Rifle Team Match (S.R.a).—1st, Fighter Command (1,288); 2nd, Flying Training Command (1,253); 3rd, Technical Training Command (1,230).

STATESMAN IN UNIFORM : Mr. Churchill Inspecting the guard of honour during his visit last Monday to No. 615 (County of Surrey) Squadron, R.Aux.A.F., of which he is Hon. Air Commodore.

Command Rifle Team Match (S.R.b).—1st, Flying Training Command (1,060); 2nd, Technical Training Command (1,058); 3rd, Bomber Command (1,053).

Command Revolver Team Match.—1st, Technical Training Command (634); 2nd, Fighter Command (609); 3rd, Flying Training Command (599).

Rothermere Shield.—1st, Fighter Command (5,794); 2nd, Technical Training Command (5,707); 3rd, Flying Training Command (5,705).

Combat Snapshooting Team Match.—1st, A.T.D.U. Gosport (66 sec, all targets); 2nd, Upwood (75 sec, all targets).

Light Machine-gun Match.—1st, Air Ministry Unit, West Drayton (136); 2nd, Syerston (131); 3rd, Bridgnorth (A) (129).

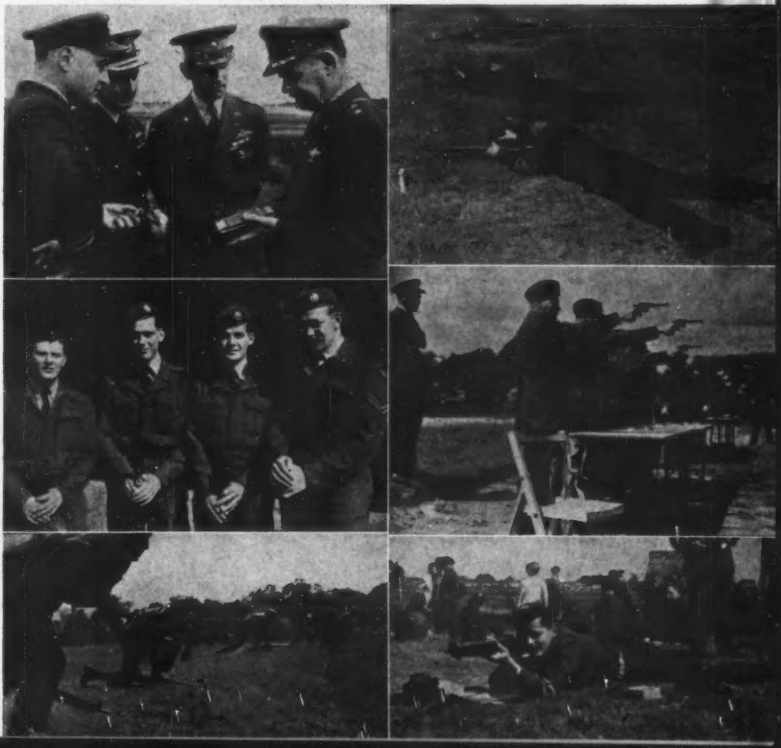
Rifle Championship.—1st, F/L. C. W. Smith, Thorney Island (347); 2nd, F/L. Dickinson, Watnell (347); 3rd, F/S. Dobriskey (347).

Small Arms Efficiency Cup.—1st, F/L. H. A. Steele; 2nd, G/C. E. G. Watt; 3rd, W/C. W. E. Ogle-Skan.

Appointments

AIR-V-M. HARCOURT-SMITH, C.B., C.B.E., M.V.O., who for the past two and a half years has been A.O.C. No. 12 Group, Fighter Command, is to go to Australia as head of the United Kingdom Service Liaison Staff.

Two Fighter Control Unit appointments have also been announced. S/L. R. W. Hill is to command No. 3617 (County of



AT BISLEY: Of the six pictures on the right, those in the top row show (left) Maj-Gen. Leon Johnson, U.S.A.F., displaying his personal radio to A.V-M. J. C. Ceuppers (Belgium), A. Cdre. S. O. Bufton, R.A.F., and Col. T. P. Orum (Denmark); right, Tie-shoot for the Rifle Championship. Middle row : left, Winning snapshooting team—J/Tech. Barnikel, S. A/C. Webster, L. A/C. Miles and Cpl. Creasey; right, Command Revolver Team Match. Bottom row : left, A "run down" during the Command Rifle Team Match, with Fighter Command, the winners, nearest the camera; right, S/Tech. C. H. Breislin, winner of the Rifle Twenty.

"Flight" photographs

SERVICE AVIATION . . .

Hampshire) Unit and S/L. F. E. Gilder will be the C.O. of No. 3614 (County of Glamorgan). S/L. Hill will have the acting rank of wing commander.

Neptunes for Australia

AN advance party of three R.A.A.F. officers have left Australia *en route* for the Lockheed factory at Burbank, California, where they will spend some time watching the building of the Neptunes bought for the R.A.A.F.; they will also fly them. The remaining 22 personnel concerned with the delivery of the aircraft will travel later.

The Neptunes will be flown back to Perth, Western Australia, where the squadron will be stationed.

Battle of Britain Re-union

A BATTLE of Britain re-union dinner will be held at Fighter Command headquarters, Bentley Priory, Stanmore, Middlesex, on Saturday, September 15th. Assembly will be at 7.30 p.m., for 8 p.m., and dress will be lounge suits.

All serving and released flying personnel who flew in fighter aircraft engaged in the Battle of Britain between July 10th, 1940, and October 31st, 1940, and who are eligible to wear the clasp of the 1939/45 Star, are invited to apply for tickets to the Senior Personnel Staff Officer, not later than August 1st.

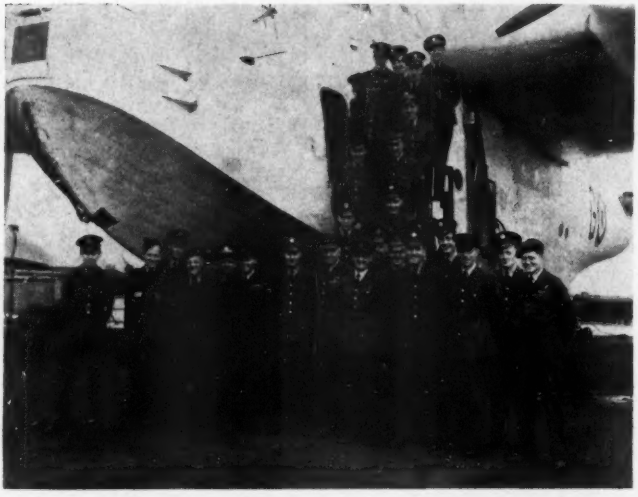
W.R.A.F. Athletic Meeting

THE Inter-Command W.R.A.F. athletic meeting is to be held at the R.A.F. stadium, Uxbridge, on Friday and Saturday of next week. Prizes will be distributed by Air Commandant N. M. Salmon, Director of the W.R.A.F.

Yellow Sea Rescue

WHEN H.M.S. *Glory* and H.M.A.S. *Bataan* were refuelling at sea, a seaman on board the former vessel caught his foot in a bight of rope and was thrown in the water.

The U.S. naval pilot of a helicopter, from which a photographer was taking air shots of the refuelling operation, saw the accident and flew to the rescue. Naval Airman E. J. King, the photographer, wearing his Mae West, dived from the helicopter and supported the half-drowned seaman until a sling was lowered for him to put round the man's body. Although he was winched up to the machine, the rescued rating was too exhausted to climb into the cabin, and completed the journey back to *Glory's* flight deck hanging half out of the helicopter. He recovered later.



WORKS WONDERS: A party of Royal Air Force apprentices from Halton who, under the command of W/C. Deane, recently made a tour of the Belfast works of Short Bros. and Harland.

M.E.A.F. Exercises Cancelled

THE big exercises, due to start early next month to test the defences of the Egyptian canal zone, have been postponed indefinitely. Announcing this cancellation, the Air Ministry said the step had been taken "for a variety of reasons". It is thought, however, that the present troubles in the Persian oilfields are the main motive in the decision.

G.S.M. for Far East Service

HEADQUARTERS R.A.A.F. have announced that the British General Service Medal, which is awarded for service in the present Malayan campaign, is also to recognize service in Java, Sumatra and Indo-China during 1945-46. The units concerned are those operating over Java and Sumatra between September 3rd, 1945, and November 30th, 1946, inclusive, and over French Indo-China between September 3rd, 1945, and January 28th, 1946. Also eligible are members of units engaged in the removal by air of internees and prisoners-of-war in South-East Asia to Singapore and other centres between September 3rd and October 4th, 1945.

Those who consider themselves eligible for awards should write to the Department of Air, Victoria Barracks, Melbourne, Australia, giving full details.

R.C.N. Air Units Renumbered

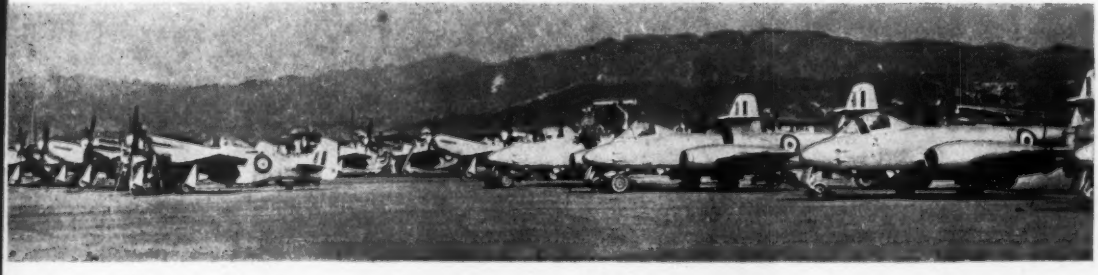
IN order to afford a measure of Canadian identity to R.C.N. air units within the Commonwealth number system, and to provide a means of numbering additional units in the event of expansion, a change in the number of air groups and squadrons of the R.C.N. has been announced. The following are the altered designations, the new numbers being in brackets: 18th Carrier Air Group (30th); 19th Carrier Air Group (31st); 803 Squadron (870); 883 Squadron (871); 825 Squadron (880); 826 Squadron (881).

Fund Expenditure

THE R.A.F. Benevolent Fund spent £156,394 during the first three months of this year on assistance to serving and ex-Service members of the R.A.F., W.R.A.F. and their dependants. Help was given in 6,433 cases.

In England 4,972 cases accounted for £134,849 and 506 Scottish cases shared £6,683. For 310 Welsh cases £6,542 was disbursed and 466 cases in Northern Ireland and Eire shared £4,268. £4,050 was spent on 179 overseas cases.

THE OLD ORDER CHANGETH: Mustangs of No. 77 Sqn., R.A.A.F., and the Meteors which are replacing them, are here seen side by side on the airfield at Iwakuni, Japan. The squadron will continue to operate under the U.S. Fifth Air Force.



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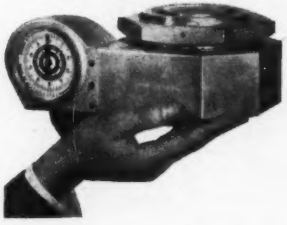

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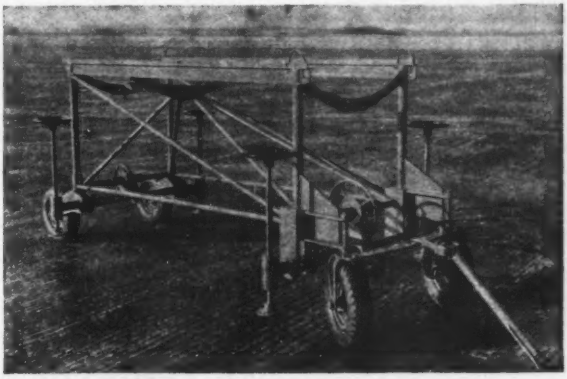

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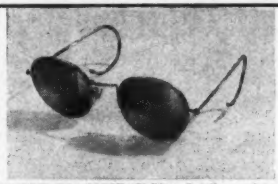

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STRESSMEN required for work on new and interesting projects. Experience of wing and fuselage stressing essential.—Applications, stating age, qualifications and previous experience, should be addressed to (Ref. FLO) Personnel Manager, D. Napier and Son, Ltd., Luton Airport, Beds. [6490

DOWTY EQUIPMENT, Ltd. Aircraft Hydraulic Engineers, Arle Court, Cheltenham, require design draughtsmen, preferably with some knowledge of hydraulic and landing gear components for aircraft. Write: Personnel Manager, giving details of training and experience, and mentioning age and salary range. [6602

MAN with initiative and experience required to work on modern aircraft electrical test installations. Applicants should hold H.N.C. and have had drawing office experience. Write, giving age, experience, salary, etc., to the Personnel Officer, Saunders-Roe, Ltd., East Cowes, I.o.W. [6432

THE Saunders-Roe weight group has vacancies for experienced junior weight engineers. Applicants with initiative and holding National Certificate should apply, stating age, experience, salary, etc., to the Personnel Officer, Saunders-Roe, Ltd., East Cowes, I.o.W. [6600

SENIOR test engineer required, age 25-35. Higher National Certificate and previous experience in aircraft hydraulics essential. Write, stating age, experience and salary required, to Mr. R. T. Sherry, Chief Test Engineer, British Messier, Ltd., Cheltenham Rd., East Gloucester. [6449

JIG and tool draughtsmen required with experience either on airframe work, plant layout, machine shop production methods, or plastic moulding and hydraulic applications. Apply, stating age, experience and salary required, to the Personnel Manager, Folland Aircraft, Ltd., Hamble, Southampton. [6426

DRAUGHTSMEN with experience in high-quality light mechanical or hydraulic engineering are required by progressive Midland manufacturing company. Positions with good prospects are available to younger men. Salaries will be in accordance with age, qualifications and experience.—State details, together salary required, to Box No. 2219. [6505

APPLICATIONS are invited from engineers with mathematical ability to fill vacancies in the hydrodynamics department for the assessment of hydrodynamic performance of seaplanes and other marine craft. Staff assurance scheme and pleasant working conditions.—Write, giving full details of age, experience, and salary expected, to Personnel Officer, Saunders-Roe, Ltd., East Cowes, I.o.W. [6544

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THE LANCASHIRE AERO CLUB, Barton Aerodrome, Eccles, near Manchester, seek the services of a chief instructor/secretary, to take full responsibility for the flying organisation of the club. The club can probably help to obtain lodgings if required. [6504

SAUNDERS-ROE, Ltd., invite applications from all grades of draughtsmen for employment in their aircraft drawing office at Cowes, and from junior draughtsmen for employment in their helicopter division at Eastleigh (Southampton).—Write, stating age, qualifications, experience and salary required to the Personnel Officer, East Cowes, I.o.W. [6500

TECHNICAL ASSISTANTS with experience of aircraft flight performance. Must have qualified at least to Higher National standard. For work on flight performance analyses on an interesting and new type of project. Location, Bedfordshire. Write, quoting age, experience and salary required, quoting reference E.8, to Box No. 3054. [6475

A VACANCY exists in the experimental department at Saunders-Roe, Ltd., for a good technician with experience in mechanical and structural testing. Applicants, who should have the H.N.C. or equivalent qualification, should write, stating age, salary, experience, etc., to the Personnel Officer, Saunders-Roe, Ltd., East Cowes, I.o.W. [6431

AIR FORCE, Naval, civil and helicopter aircraft all under design and development at Percival Aircraft, Ltd. Applications are invited from senior and junior draughtsmen, and stressmen, for work on this interesting programme. Write, giving details of experience and salary required, to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Luton, Beds. [6596

ENGLISH ELECTRIC invite applications from all grades of draughtsmen to work on an interesting new project in the Acton, London, aircraft drawing office. These positions are permanent and pensionable. Those wishing to apply should write, quoting Ref. 149B, to Central Personnel Services, English Electric Co., Ltd., 24-30, Gillingham St., London, S.W.1. [6408

VACANCIES exist for senior design draughtsmen for experimental work in light engineering. Men with design ability and experience of small hydraulic and mechanical precision mechanisms, and with good practical and technical education, are invited to make application by letter only in the first instance, to the Personnel Manager, Boulton Paul Aircraft, Ltd., Wolverhampton. [6540

H. M. HOBSON, Ltd., invite applications for positions in the drawing office as follows. Designers, detail and modification draughtsmen, checkers, stressmen. The work is concerned with interesting projects connected with fuel metering equipment and hydraulic flying controls for aircraft.—Hobson Works, Fordhouses, Wolverhampton. [6420

APPLICATIONS are invited from senior and intermediate design draughtsmen: experience of aero engine design desirable but not essential. Please write, stating age and giving details of previous experience in chronological order, to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [6449

DEVELOPMENT engineers and senior draughtsmen required with experience in light hydraulic controls and/or fuel metering equipment; also detailing draughtsmen for this type of work. The factory is situated in the grounds of a country house and the wages and conditions are excellent. Hostel available. Write: Personnel Manager, Dowty Equipment, Ltd., Arle Court, Cheltenham. [6603

TECHNICAL writer wanted by large engineering firm manufacturing aircraft accessories. Previous experience in a similar capacity an advantage, but consideration given to applicants with good practical experience, coupled with sound technical education. Post is progressive. Assistance given to successful applicant in finding suitable accommodation. Write, stating age and experience, etc. —Box No. 2331. [6539

HANDLEY PAGE, Ltd., have vacancies for a technical assistant with a good mechanical engineering background, who will be required to carry out work in connection with thermo-dynamic problems for aircraft air conditioning and thermal de-icing systems. Please state age and giving particulars of qualifications and experience, to Staff Officer, Handley Page, Ltd., Claremont Rd., London, N.W.2. [6436

HANDLEY PAGE Ltd., have vacancies for Senior and Junior Technical Assistants in the Mechanical and Structural Test Department at Radlett or Cricklewood. Qualifications should include a Degree or Higher Technical Certificate. Previous experience is desirable but not essential.—Write, stating age, qualifications and details of experience to: Staff Officer, Handley Page Ltd., Cricklewood, London, N.W.2. [6478

THE Parsons and Marine Engineering Turbine Research and Development Association requires a Thermodynamicist for work associated with the development of liquid-cooled gas turbines for marine propulsion. Applicants should be British subjects with good qualifications and research experience.—Apply in writing, stating salary expected, to the Research Director, Pametrada Research Station, Wallsend. [6513

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DESIGN and development engineers are required by the English Electric Co., Ltd., for their gas turbine department at Rugby. Applicants should have a Higher National Certificate or a degree coupled with a practical engineering background, preferably directly concerned with gas turbines.—Please write, giving full details of qualifications and experience, and quoting Ref. 345, to, Central Personnel Services, English Electric Co., Ltd., 24/30, Gillingham St., London, S.W.1. [6501

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HANDLEY PAGE (READING) Ltd., have vacancies in their design office for senior and junior draughtsmen with aircraft experience. Also required are stressmen, who should have at least two years' experience and with a degree or Higher National Certificate with endorsements in aeronautical subjects. These positions are progressive and offer excellent opportunities to the right men.—Please send full particulars to the Personnel Office, Handley Page (Reading), Ltd., The Aerodrome, Woodley, Reading. [6001

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BRITISH EUROPEAN AIRWAYS have a vacancy for an Inspector I/c at their Renfrew Base, Glasgow. He will be responsible to the Chief Inspector, for supervision of the base, including workshops inspection staff and the maintenance of engineering and inspection standards during the overhaul and maintenance of the Corporation's aircraft. Desirable qualifications are: (a) Considerable aircraft engineering experience, particularly maintenance and airline operation; (b) Factory experience, with knowledge of inspection procedure and applied bonus methods; (c) Up-to-date knowledge of inspection methods and procedure, and being fully conversant with A.R.B. and M.C.A. regulations and requirements; (d) Possession of current British Aircraft Engineers' licences. Commencing salary will be not less than £900 per annum. Applications to Personnel Manager, B.E.A., Keyline House, Ruislip, Middx. [6519

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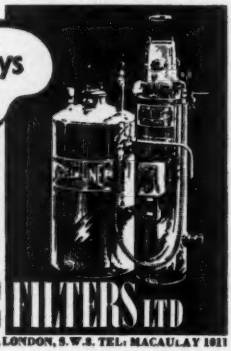

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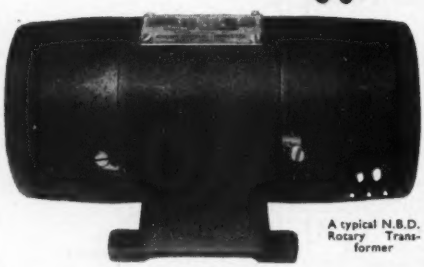

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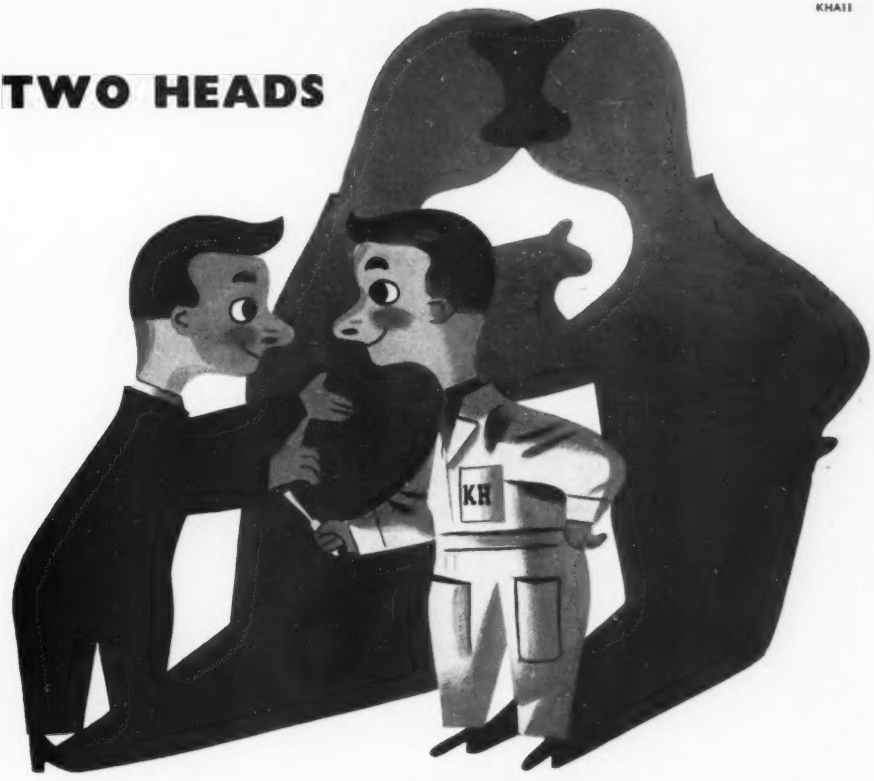

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